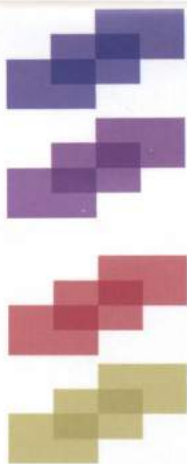


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SCRIPT

Elderly man started on allopurinol for gout 3 weeks ago presents with:

- Diffuse generalized maculopapular rash
- Lymphadenopathy
- Malaise, fatigue
- Peripheral eosinophilia, elevated liver enzymes

What is the diagnosis?

Diagnosis is **DRESS syndrome**.

Drug Rash with Eosinophilia and Systemic Symptoms. Patients typically develop a pleomorphic rash, peripheral eosinophilia, fever, lymphadenopathy, and multi-organ involvement (liver, kidney, cardiac, etc.). Usually occurs 2 to 8 weeks after exposure to the offending drug, typically with aromatic anti-convulsants, minocycline, and allopurinol. Recently, reactivation with human herpesvirus 6 has been implicated.

Dx: Clinical diagnosis. Skin biopsy may be helpful, but not diagnostic.

Tx: Stop the drug. Glucocorticosteroids and IVIG may be beneficial.

SCRIPT

Middle-aged woman presents with:

- Chronic daily hives lasting more than 24 hours
- Hives described as painful and burning rather than pruritic
- Joint pain and swelling
- Malaise, fatigue, and weight loss
- Associated purpura and ecchymosis

What is the diagnosis?

Diagnosis is **urticarial vasculitis**.

It is important to distinguish between urticarial vasculitis and chronic idiopathic urticaria. In urticarial vasculitis, patients report hives lasting ≥ 24 hours in a fixed location. (In contrast, in chronic urticaria, the hives last only minutes to hours, or migrate to different locations.) Often, patients will describe the hives as burning and painful. Other red flags that distinguish urticarial vasculitis from chronic idiopathic urticaria include residual hyperpigmentation, purpura, ecchymosis, petechiae, arthralgia/arthritis, fatigue, malaise, and weight loss.

Dx: Skin biopsy. Occasionally $\downarrow$ C4 and C3 levels.

Tx: Immunosuppressive agents (MTX, azathioprine, cyclosporine).

SCRIPT

Young female with PMH childhood pneumonia, pneumococcal bacteremia, and recurrent sinus infections presents with 6 month h/o:

- Fevers, weight loss, arthralgias
- Intermittent cola-colored urine
- Papulosquamous rash on both cheeks and nose that spares nasolabial fold
- Violaceous mottled rash on forearms and thighs
- Bilateral MCP synovitis
- ↓ WBC, Hgb, and Plt
- + Coombs test
- U/A: RBC casts, 3+ protein
- + Anti-dsDNA and anti-Sm

What is the diagnosis, and what is it associated with?

Diagnosis is systemic **lupus erythematosus** associated with **early complement deficiency**. The clinical history, physical examination, and labs point toward the diagnosis of SLE. But there is more to the story... PMH focuses on recurrent sinopulmonary infections. Know that homozygous early complement deficiency (especially C1, C2, and C4) is associated with recurrent bacterial sinopulmonary disease and development of SLE. Usually, a case of untreated SLE without an underlying complement deficiency will **not** have the history of repeated pneumococcal infections.

Dx: SLE Dx is clinical; complement deficiency is diagnosed with the CH50 assay, which assesses the classic pathway. Homozygous deficiencies result in a very low CH50 value.

Tx: Vaccinations (can get live virus vaccines), especially meningococcal and pneumococcal conjugates + standard treatment for lupus (immunomodulation) + prophylactic antibiotics for sinopulmonary infections.

SCRIPT

Young adult on no meds presents with episodic, nonpitting, nonpruritic lip, facial, and extremity edema that:

- Began in adolescence; + FH in parent
- Symptoms triggered by visits to the dentist
- Preceded by tingling in the lips with swelling over 24–72 hours
- Occasionally progresses to laryngeal edema
- Associated with intermittent abdominal colicky pain
- Symptoms resolve after 1–2 days
- Unresponsive to antihistamines

What is the diagnosis?

Diagnosis is **hereditary angioedema**.

Hereditary angioedema (HAE) is an autosomal dominant disorder. It is caused by a decrease in C1 inhibitor (C1-INH) function. There are two types: Type 1 (85%) = decreased C1 inhibitor enzyme; Type 2 (15%) = non-functioning C1 inhibitor enzyme. Patients have recurrent non-pitting edema with each episode, lasting 1–3 days. Unlike angioedema/urticaria caused by immediate hypersensitivity reactions, hereditary angioedema does not cause urticaria or itching. Bradykinin is thought to be the key mediator in the angioedema attacks. Even minor trauma from dental procedures can precipitate attacks! Attacks may include laryngeal obstruction and very often affect the GI tract, causing severe abdominal pain.

Dx: ↓ C4 levels **during** attacks. C4 might be normal in between attacks. Low C1-INH function is diagnostic. Type 1: ↓ C1-INH level; decreased function; Type 2: normal C1-INH level; decreased function.

Tx of acute attack: C1-INH protein infusion or icatibant (synthetic bradykinin receptor antagonist) or ecallantide (kallikrein inhibitor) or FFP (if others not available).

Do not use: Glucocorticoids, antihistamines, or epinephrine; they don't work!

Prevention of attacks: Attenuated androgens (danazol) or C1-INH protein infusion.

Misc: Don't forget this! The prescription of ACE inhibitors can worsen HAE (because ACE breaks down bradykinin, so inhibition of ACE increases the level). Narcotics also can precipitate attacks.

SCRIPT

Young adult with h/o *N. meningitidis* bacteremia at age 15 presents with:

- Fever and HA
- Stable BP
- Diffuse erythematous maculopapular rash on the extremities and thorax
- Petechiae on the oral mucosa and conjunctiva
- Absent Kernig and Brudzinski signs
- Blood cultures: Gram-negative cocci

What is the diagnosis, and what is it associated with?

Diagnosis is **recurrent meningococcal infection** associated with **terminal complement deficiency**. Suspect terminal complement deficiency when you see more than one episode of invasive *Neisseria*. Deficiencies in the alternative pathway (factors D and properdin) are also associated with *Neisseria* but are very rare.

Dx: CH50 assay, which assesses the classic pathway; AH50 assay assesses the alternative pathway.

Tx: Vaccinations (can get live virus vaccinations), especially meningococcal and pneumococcal conjugates and vigilance for symptoms/signs of infection.

SCRIPT

Healthy patient presents with acute:

- Generalized hives
- Dyspnea with wheezing after using latex gloves
- ↑ HR, normal BP
- ↓ O₂ sats
- Decreased air movement in the lungs and audible wheezing

What is the diagnosis?

Diagnosis is **anaphylaxis**.

Anaphylaxis is diagnosed when **any** one of the following 3 criteria is fulfilled:

- 1) Sudden onset with involvement of the skin/mucosal tissue **and** either:
Sudden respiratory symptoms **or** Hypotension
- 2) Two or more of the following that occur suddenly after exposure to a likely allergen:
Skin/Mucosal tissue involvement Hypotension
Respiratory involvement GI symptoms
- 3) Hypotension after exposure to known allergen

Note that hypotension is **not** always required for the diagnosis of anaphylaxis. The patient in the vignette satisfies criteria #2, as patient had skin/mucosal involvement and respiratory symptoms after exposure to latex. Other common triggers include: pollen, animal dander, food (nuts, shellfish, milk, eggs, fish), insects (bees, hornets, wasps), and drugs (beta-lactams, anesthetics, muscle relaxants).

Dx: Clinical as above.

Tx: **Epinephrine** is first line therapy! Albuterol can be given for wheezing; antihistamines for hives and pruritus; normal saline for hypotension.

SCRIPT

Otherwise healthy patient develops:

- Itchy hives on the thighs and chest after exercise and hot showers
- No wheezing or breathlessness

What is the diagnosis?

Diagnosis is **cholinergic urticaria**.

Cholinergic urticaria is precipitated by **heat** (e.g., hot shower, hot day, exercise). Usually presents as punctate lesions that are very pruritic. Note that exercise-induced urticaria is a separate entity where the patient gets hives **only** with exercise. With cholinergic urticaria, the hives occur with any increase in body temperature, such as heat, exercise, or warm blankets.

Dx: Heat provocation.

Tx: May treat symptoms with 1st generation antihistamines such as hydroxyzine or 2nd generation antihistamines such as cetirizine.



SCRIPT

Patient presents with:

- Chronic rhinorrhea and nasal congestion in spring and fall
- Bilateral conjunctival injection, dark circles around both eyes, and Dennie-Morgan lines
- Pale blue nasal mucosa with edematous turbinates

What is the diagnosis?

Diagnosis is **allergic rhinitis**.

Clues here are the seasonal components to the symptoms and the exam showing findings specific for allergic rhinitis: Allergic "shiners," "Dennie-Morgan lines" (which are accentuations of lines under the eyes), and pale blue "boggy" nasal mucosa. Occasionally, patients can have perennial allergic rhinitis, which presents without the seasonal variation. Perennial allergens include: animal dander, cockroaches, and dust mites.

Dx: Clinical + nasal secretions show $\uparrow$ eosinophils, and allergen testing for inhaled allergens is useful.

Tx: Antihistamines $\pm$ intranasal steroids $\pm$ immunotherapy ("allergy shots").

SCRIPT

Patient presents with:

- Chronic nasal congestion, worse in the spring and fall
- Swollen and “beefy red” nasal mucosa

What is the diagnosis?

Diagnosis is **rhinitis medicamentosa**.

Rhinitis medicamentosa is rebound congestion caused by prolonged use of vasoconstricting nasal drops (phenylephrine or oxymetazoline). Often the Board exam will not give you the history of using OTC nasal sprays. They expect you to interpret the physical exam and make the diagnosis based on the buzz phrase "beefy red nasal mucosa" or something similar. Compare this to the "pale blue" or "boggy" nasal mucosa seen in patients with allergic rhinitis. Note that the main complaint in rhinitis medicamentosa is **congestion**, not rhinorrhea. Use of intranasal alpha-blockers should be limited to < 5 days because of this risk.

Dx: Clinical.

Tx: Discontinue the vasoconstricting nasal spray **and** start intranasal steroids.



SCRIPT

Young adult with PMH:

- Recurrent sinus infections requiring extended antibiotic courses to clear
- 4 episodes of pneumonia in the past year
- Chronic diarrhea

What is the diagnosis?

Diagnosis is **common variable immunodeficiency (CVID)**.

Patients with CVID have increased susceptibility to encapsulated organisms such as *S. pneumoniae* and *H. influenza*. Recurrent infections of the sinopulmonary tract are the most common problem. These may be severe, prolonged, or require extended courses of oral antibiotics or IV antibiotics to clear. They also tend to get giardiasis and enterovirus infections. Additionally, patients with CVID are at increased risk for autoimmunity, including autoimmune cytopenias, a sprue-like disease, inflammatory bowel disease, and a sarcoid-like granulomatous disease. Risk of malignancy is also increased in this patient population.

Dx: Decreased levels of serum IgG +/- IgA and IgM; inability to mount appropriate response to vaccinations.

Tx: IVIG or SQIG. Monitor for signs of autoimmune complications and malignancy.

Cardiology

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SCRIPT

40-year-old patient with long h/o fatigue, exercise intolerance, and episodic palpitations presents with acute onset:

- Right hand weakness and dysarthria
- Normal JVP
- No lower extremity edema
- Wide, fixed split of S_2 when standing
- Midsystolic ejection murmur at 2nd left intercostal space
- ECG: Sinus rhythm
- CXR: RAE

What is the underlying cause of the stroke?

Diagnosis is **paradoxical embolism due to ASD**.

This is a tricky script that represents a sequence of events culminating in a paradoxical embolus. It presents a stroke in the middle cerebral artery territory that occurred as a result of atrial fibrillation caused by an ASD. The physical exam and the radiograph give you clues to the underlying ASD diagnosis. Prior to the development of severe RV overload and high pulmonary flow rates that cause pulmonary hypertension, the shunting of blood through an ASD is left-to-right; the S_2 is fixed and widely split, and a TR murmur is audible. The RA and RV distend from the volume overload. With time, pulmonary hypertension develops, and the shunt becomes right-to-left (Eisenmenger syndrome), the S_2 split disappears, the P_2 gets loud, and the TR murmur resolves. Clubbing and cyanosis eventually develop. The RAE and stroke tell you that this patient's shunt physiology is now right-to-left, although the S_2 findings haven't changed yet. "Wide, fixed split" is a buzz phrase for ASD. Other ECG findings consistent with ASD that might be obvious in a normal rhythm include: 1st degree AV block, R-axis deviation, and rSr' or rsR' in V1 consistent with incomplete RBBB.

Dx: Clinical + Doppler echo (with or without agitated saline—the "bubble echo").

Tx: Depends on extent of shunt (surgery for large ones).



SCRIPT

Patient with h/o coronary heart disease presents with:

- Recent onset of “lightheadedness” and feeling as if about to “pass out”
- Decreased exercise capacity
- HR < 40 bpm
- No JVD
- Cannon a waves
- ECG: Wide QRS rhythm with dissociated, regular interval P waves

What is the diagnosis?

Diagnosis is **complete (3rd degree) heart block**.

Remember: Cannon a waves are seen in cases of AV dissociation. Note that the heart rate is very slow and the QRS is wide, which tells you that the rhythm is junctional escape, not a wide complex tachycardia. Obviously, the cause here is ischemic heart disease, but remember the other causes: Lyme carditis, Chagas, scleroderma, RA, SLE, sarcoid, hemochromatosis.

Dx: ECG + specialized cardiac testing (vagal maneuvers, sinus massage, atropine, EP testing).

Tx: Pacemaker implantation (should be used in anybody with symptomatic brady and irreversible 2nd or 3rd degree block).



SCRIPT

Female patient, smoker, on OCPs presents with acute onset:

- Dyspnea
- Pleuritic chest pain
- ↓ BP
- ↑ HR
- Increased P₂ component of S₂
- ↓ pO₂
- ↑ D-dimer
- ↑ Troponins

What is the diagnosis?

Diagnosis is **pulmonary embolism**.

A smoker on oral contraceptives who presents with pleuritic chest pain has a PE until proven otherwise. Troponins can be increased in PE as a result of RV strain, and they actually are used for prognostic purposes in acute PE. The level goes up and comes down quickly, however, as opposed to the pattern of troponin elevation in AMI where the level goes up and stays up for days.

Dx: CT pulmonary angiography (or Doppler ultrasound, if a swollen extremity or venous catheterization is included in the clinical scenario) ± evaluation for inherited thrombophilia (activated protein C resistance, which used to be called *Factor V Leiden* mutation; prothrombin *G20210A* mutation; protein C, S, and antithrombin III deficiencies).

Tx: Anticoagulation with low-molecular-weight heparin is treatment of choice if stable; if unstable or with decreased renal function, unfractionated heparin is recommended → warfarin for variable duration depending on etiology of clot.



SCRIPT

Young patient with h/o primary Raynaud's presents with:

- Acute chest discomfort
- ↑ BP
- Urine drug screen is negative for cocaine
- ECG: ST-segment elevation > 1 mm in leads II, III, and aVF that returns to normal as soon as the chest discomfort subsides
- Cardiac catheterization: normal coronary arteries

What is the diagnosis?

Diagnosis is **variant angina (Prinzmetal's)**.

More often, vasospasm with normal coronaries occurs in the inferior distribution, and the ST elevation is seen in leads II, III, and aVF. ST-segment elevation in myocardial infarction would not return to normal within minutes and with cessation of chest pain. Cocaine is a definite risk factor for coronary spasm. Spasm also occurs more often in patients with Raynaud's.

Dx: Clinical + transient ST elevation with pain at rest on ECG + coronary artery spasm observed at catheterization.

Tx: Nitrates + CCBs.

Misc: About 1/4 of patients will have a non-fatal MI during a spasm; prognosis excellent at 5 years, however. Those with arrhythmias during the event are at higher risk for sudden death.

SCRIPT

Patient with h/o hyperlipidemia and HTN is admitted for STEMI. On day 3, she develops:

- Acute dyspnea
- ↓ BP
- Bilateral rales ± JVD
- Hyperdynamic precordium with new systolic murmur at lower left sternal border

What is the diagnosis?

Diagnosis is **papillary muscle rupture**.

Recognize that the murmur of acute MR is not present in all cases, and it is heard best at the base of the heart (LLSB), instead of at the apex, as in chronic MR. Sometimes the murmur has a "musical" quality. Think about papillary muscle rupture in **any** patient who develops sudden hypotension and acute pulmonary edema within days of an uncomplicated MI.

Dx: Echo.

Tx: Surgery after medical stabilization (afterload reduction $\pm$ intraaortic balloon pump or inotrope).

SCRIPT

Patient with h/o hyperlipidemia and HTN is admitted for anterior STEMI. On day 3, she develops:

- ↓ BP
- Acute JVD, bilateral rales, and lower extremity edema
- Hyperdynamic precordium with a thrill and a new loud, harsh, holosystolic murmur at lower left sternal border with wide radiation

What is the diagnosis?

Diagnosis is **ventricular septal rupture**.

When seen, this complication occurs ~ 3–5 days post-MI. Differentiate septal rupture from papillary muscle rupture by the presence of biventricular failure and the harshness of the murmur at the base of the heart.

Dx: Clinical + Doppler echo + PA catheter (documents left-to-right shunting).

Tx: Surgery after medical stabilization (afterload reduction + inotropes ± intraaortic balloon pump) for patients in cardiogenic shock; surgery can be postponed in those patients with biventricular failure without shock.

SCRIPT

Elderly female patient with h/o hyperlipidemia and HTN is admitted for a large, anterior STEMI. Within 5 days, she develops:

- Acute recurrent pain
- Nausea
- Restlessness
- ↓ BP
- PR prolongation and ST-segment elevation

What is the diagnosis?

Diagnosis is **incomplete ventricular free wall rupture**.

Complete free wall rupture leads to immediate tamponade, then pulseless electrical activity, then death. **Incomplete** rupture occurs when a clot seals over the perforation, essentially buying the patient time. Features of incomplete rupture are important to recognize (and distinguish from recurrent angina or infarct extension) because the patient can progress to complete rupture. New features of pericarditis on ECG and unexplained restlessness and hypotension in a patient with new pain should tip you off. Fibrinolytic agents increase the risk of rupture and the speed of death from the complication, especially in patients older than 75 years.

Dx: Clinical + ECG (assess for evidence of tamponade) + pericardiocentesis (if tamponade present) + bedside echocardiogram.

Tx: Surgery after medical stabilization (afterload reduction + inotropes ± intraaortic balloon pump).

SCRIPT

40–50-year-old male smoker with h/o bluish discoloration of fingers on exposure to cold presents with:

- Claudication in both feet, calves, and in the hands, that progresses to rest pain
- Nail changes and ulcerations on the toes and fingers
- Decreased radial, ulnar, and tibial pulses
- Obvious superficial vein thrombophlebitis on a lower extremity
- Negative ANA, RF, anti-centromere, anti-Scl-70, antiphospholipid antibodies
- TEE: No thrombus or vegetations; normal serum complement

What is the diagnosis?

Diagnosis is **thromboangiitis obliterans (Buerger disease)**.

Smoking activates this disease, which affects only the distal upper extremities and the lower extremities. Think about Buerger's in any Board scenario where a smoker has peripheral vascular disease. On an exam, the clinical scenario should include enough info to exclude autoimmune vasculitis and endocarditis as causes of the ulcerations. The clinical triad is: Raynaud's, claudication, and migratory superficial thrombophlebitis.

Dx: Clinical + arteriography (shows tapering of distal vessels with collaterals) ± excisional biopsy with characteristic pathology.

Tx: Smoking cessation, but improvement is minimal even in those who quit. Arterial bypass sometimes is used.

SCRIPT

Male patient in his 60s with h/o HTN presents with:

- Weakness, dyspnea, and diaphoresis
- Acute, severe, “tearing” chest pain radiating to the back and abdomen
- ↓ BP & > 20 mm difference in SBP between upper arms
- Normal JVP
- Diastolic, decrescendo murmur loudest at R 2nd IC space
- ECG: Nonspecific ST- and T-wave changes
- CXR: Widened mediastinum

What is the diagnosis?

Diagnosis is **aortic dissection**.

You might have guessed inhalation anthrax if you loosely associate the term "widened mediastinum" with anthrax. However, anthrax presents as a fulminant sepsis syndrome related to the anthrax toxin, not as isolated chest pain. This diagnosis is distinguished from angina by the quality of the pain, the difference in the blood pressures in upper extremities, the radiograph showing the widened mediastinum, and the nonspecific (or normal) ECG. Usually, the description of the pain is helpful (described as "tearing," or "ripping," or "sharp"). If the dissection involves a coronary artery, the ECG can show ischemia in that distribution, so those cases are tricky. HTN is risk factor in 70% of cases; other RFs: Marfan's, Ehlers-Danlos, Takayasu's, temporal arteritis, congenital AV disease, and coarctation. In patients with proximal dissection, an acute AR murmur sometimes can be heard.

Dx: Clinical + transthoracic echo or CT or MRI.

Tx: ICU admission + hemodynamic monitoring + IV beta-blocker (aim for HR 60) + antihypertensive (aim for SBP < 120) + emergent surgical correction.

Misc: Hydralazine is contraindicated because it may worsen the dissection.

SCRIPT

Male patient with known bicuspid aortic valve presents with:

- ↑ BP in the arms
- Diminished femoral pulses
- ↓ BP in the lower extremities
- ECG: LVH
- CXR: Notching on ribs 3–9

What is the diagnosis?

Diagnosis is **coarctation**.

It's unlikely that the case will give you the lower extremity blood pressures as part of the clinical scenario—that makes the diagnosis too easy. You should know to perform those measurements when you diagnose hypertension in a patient with unequal pulses (diminished in the lower extremities). Another clinical clue is a pulse delay in the femoral arteries, as opposed to a diminished pulse. Remember the association between bicuspid valves and coarctation; Turner's also is associated. Some patients with coarctation will have aneurysms in the Circle of Willis that are prone to sudden rupture. The rib notching on CXR, from formation of collateral vessels, is pathognomonic.

Dx: Echo.

Tx: Surgical correction or balloon dilatation with stent placement.



SCRIPT

Adolescent patient with h/o sore throat and fever 2 weeks ago presents with:

- Migratory swelling and pain in large joints
- An erythematous, serpiginous rash on the thorax
- Fever
- A systolic murmur at the apex
- Normal JVP and clear lungs
- ECG: Prolonged PR interval

What is the diagnosis?

Diagnosis is **acute rheumatic fever**.

Remember that the valve disease in acute rheumatic fever is mitral and/or aortic regurgitation, but the chronic valve lesion most associated with rheumatic heart disease is mitral stenosis. Be able to recognize the Jones criteria anytime you have a possible antecedent group A strep pharyngitis: Arthritis, carditis, chorea, erythema marginatum, sub-Q nodules (major) and arthralgia, fever, increased ESR, prolonged PR interval (minor).

Dx: Use the Jones criteria; clinical + evidence of antecedent infection with group A streptococci.

Tx: Penicillin + aspirin for fever $\pm$ corticosteroids for heart involvement $\pm$ IVIG (if chorea present).



SCRIPT

Patient older than 60 years presents with gradual onset:

- Decreased exercise tolerance because of fatigue
- Exertional dyspnea
- Weak carotid pulse with slow rate of rise
- Harsh, crescendo-decrescendo, systolic murmur, loudest at the RUSB
→ neck
- Absent S₂ split

What is the diagnosis?

Diagnosis is **aortic stenosis**.

Remember that the loudness and the timing of the murmur correlate with severity: Louder, later murmurs (closer to S_2) mean more severe disease. "Pulsus parvus et tardus" is the phrase used to describe the pulse finding in severe AS, where the pulse generally is diminished with a slow rise. As disease worsens, patients may develop syncope, angina, and heart failure.

Dx: Doppler echo.

Tx: Valve replacement, optimally performed prior to the onset of LV failure. Replace when AS is severe (valve area $< 1 \text{ cm}^2$ + symptoms), when the EF is $< 50\%$, and in asymptomatic patients with AS who are undergoing CABG.

Misc: Presence of the S^2 split is reliable in excluding AS, because the A_2 and P_2 components become simultaneous as the stenosis worsens; so their presence, audible as a split, tells you that AS is not present.



SCRIPT

Previously healthy patient presents with 1 week of:

- Exertional dyspnea and fatigue
- Chest discomfort and fullness
- Clear lungs, muffled heart sounds, lower extremity edema
- ↓ BP and ↓ in SBP > 10 mm with inspiration
- Jugular venous distension with rapid x descent & normal or absent y
- ECG: Sinus tachycardia, low voltage across all leads, diffuse ST elevation with some T-wave inversions
- CXR: Enlarged cardiac silhouette

What is the diagnosis?

Diagnosis is **acute pericarditis with pericardial tamponade**.

This script details a subacute presentation of idiopathic pericarditis with tamponade. Classic triad is hypotension, distended neck veins, and muffled heart sounds. "Pulsus paradoxus" is a decrease in SBP with inspiration (also associated with acute asthma, COPD, and pulmonary embolism). PA catheter readings would show equalization of diastolic pressures across all chambers. Be able to differentiate acute tamponade from constrictive pericarditis (which has both a rapid x and y descent), acute MI (would have evidence on ECG), and acute aortic dissection (should not have JVD or LE edema). Recognize that the ECG findings in this script are due to the cause of the tamponade (pericarditis) and not the tamponade itself, (except for the low voltage).

Dx: Clinical + ECG + echocardiogram.

Tx: Pericardiocentesis or pericardial window.

SCRIPT

Patient with h/o HTN presents with acute onset chest pain, diaphoresis, nausea, and:

- ↓ BP
- Jugular venous distension with increased *a* and *v* waves
- Clear lungs
- ECG: Sinus bradycardia, ST elevation in leads II, III, aVF, and V4R–V6R
- PA catheter: ↓ CO, ↓ PCWP, ↑ RAP (10 or greater), and ↓ cardiac index

What is the diagnosis?

Diagnosis is **right ventricular infarction**.

Most RV infarcts occur because of right coronary artery occlusion. About half will have a bad outcome related to electrical (SA or AV node) or blood pressure problems. Bradycardia is more common in inferior infarctions that include the right ventricle. The V4R–V6R leads should be assessed in patients with evidence of an inferior MI, so that involvement of the right ventricle can be specifically assessed. Echo helps to distinguish from acute PE and tamponade, which can present similarly. Also, ST elevation is not seen in acute PE, although a pattern of RV strain can be seen. Echo also helps to determine if the right ventricle is the source of low CO, or if the left ventricle also is impaired. Knowing the status of ventricular function helps you know how to treat the hypotension.

Dx: Clinical + ECG ± echo.

Tx: (Emergent reperfusion + antiplatelet Rx + anticoagulation + statin) + (IV fluids ± inotropes [if RV dysfunction], but no nitrates, diuretics, or narcotics!) or (intraaortic balloon pump [if LV dysfunction]). Pacing, if necessary.



SCRIPT

Patient presents confused, agitated, and hypotensive with the following hemodynamics:

- ↓ CO
- ↑ PCWP
- ↑ RAP
- ↓ Cardiac index

What is the diagnosis, based on the PA readings?

Diagnosis is **cardiogenic shock**.

Lots of causes: AMI, myocarditis, aortic dissection with AI or tamponade, aortic stenosis, mitral stenosis, acute AR, acute MR, severe PE, right ventricular infarct that impacts the left ventricle. Definitely know how to interpret PA catheter readings for the exam. Clinical use is controversial, but they often are employed to help with diagnosis and to guide treatment decisions.

Dx: Clinical + echo + PA catheter.

Tx: Depends on underlying cause.

SCRIPT

Patient has h/o occasional exertional syncope with the following hemodynamics:

- Normal PCWP
- ↑ RAP

What is the diagnosis, based on the PA readings?

Diagnosis is **pulmonary HTN**.

In an exam scenario, you may get additional clues, such as physical exam findings of a loud P_2 , wide S_2 split, and an inspiratory murmur of tricuspid regurgitation. But, be able to recognize pulmonary arterial HTN solely from PA catheter hemodynamics.

Dx: Clinical + echo + PA catheter.

Tx: Depends on underlying cause.



SCRIPT

Patient admitted to the CCU s/p AMI has central venous catheter placed in the R-IJ, then develops:

- Chest pain, dyspnea, and confusion
- ↓ BP with ↓ in the SBP > 10 mm with inspiration
- Tachypnea with increased hemithorax
- Distended neck veins
- Diminished breath sounds on the right
- CXR: Shift of mediastinum to left

What is the diagnosis?

Diagnosis is **tension pneumothorax**.

This script asks you to integrate a critical intervention into the differential diagnosis of post-MI chest pain and acute decompensation. The history of the R-IJ placement is relevant, as it is the cause of the tension pneumothorax. You might have guessed the other causes of post-MI decompensation, such as papillary muscle rupture, VSD, and free wall rupture. None of these present with pulsus paradoxus, distended neck veins, reduced breath sounds, and a shifted mediastinum. Recognize that this presentation is similar to that of acute tamponade and constrictive pericarditis because, essentially, the air in the thorax prevents proper diastolic filling. Also consider this diagnosis if the clinical scenario presents a ventilated patient on high PEEP who suddenly decompensates. The radiograph will show a shift of the mediastinum to the contralateral side.

Dx: Clinical + chest radiograph + escape of gas after needle placement into pleural space at 2nd intercostal space.

Tx: Emergent needle placement, then thoracostomy tube.



SCRIPT

Patient with h/o bicuspid valve presents with:

- Dyspnea on exertion
- $\uparrow$ SBP, $\downarrow$ DBP, and “water hammer pulse”
- High-pitched, blowing, diastolic murmur (louder with squat and handgrip; softer with Valsalva), and loudest at left mid-sternal border while leaning forward with held expiration
- Midsystolic murmur also audible at the LLSB and apex
- $\pm$ Diastolic rumbling, loudest at the apex

What is the diagnosis?

Diagnosis is **chronic aortic regurgitation**.

The associations to make with chronic AR are: bicuspid valve and Marfan's (rare). An increased SBP with a low DBP is termed a "wide pulse pressure." You're unlikely to see the words "wide pulse pressure" in a question, but note the wide difference between the systolic and diastolic pressures. "Water hammer pulse" refers to a brisk fill with a sudden collapse and is sometimes called "Corrigan's" pulse. This script describes 3 murmurs that can be auscultated in patients with chronic AR: The diastolic AR murmur at the left midsternal border + a midsystolic ejection murmur audible at the LLSB and apex + the Austin Flint apical diastolic rumbles. In severe AR, the clinical scenario could include symptoms and signs of LV left failure. Know that acute AR presents differently, and you would more often suspect acute endocarditis in patients with acute AR.

Dx: Doppler echo.

Tx: Medical management of early disease (afterload reduction + diuretic); surgery when LV function begins to decline but before onset of symptoms (requires close echo f/u).

SCRIPT

Pregnant patient with no PMH presents with 1 week of:

- Exertional dyspnea
- Paroxysmal nocturnal dyspnea
- Cough with foamy hemoptysis
- NI to ↑ JVP
- Loud S_1 and loud P_2 component of S_2 split
- Diastolic snap sound, audible at apex
- Low-pitched, diastolic rumble after the snap, heard only at the apex in LLD position

What is the diagnosis?

Diagnosis is **mitral stenosis**.

The diastolic snap sound could be mistaken for the P_2 component of an S_2 split, but the S_2 split is best heard at the base of the heart (LLSB) and not at the apex. So if the diastolic snap sound is best heard at the apex, in the mitral area, it is probably an opening snap. Note also, the S_1 and P_2 component of S_2 is accentuated in MS; the diastolic murmur crescendos into the S_1 sound, making S_1 quite loud. In pregnancy, the MS murmur is often very difficult to hear, so a clinical case might leave the murmur out of the scenario; be suspicious of MS in any pregnant patient who develops acute pulmonary symptoms with foamy hemoptysis. The increased cardiac output in pregnancy often results in presentation of previously unknown MS.

Dx: Doppler echo.

Tx: Penicillin prophylaxis of group A strep infection in patients with known MS to prevent recurrent rheumatic heart disease. Treat symptomatic MS with diuretics + beta-blockers or CCBs ± digoxin. Add warfarin for patients with MS-induced atrial fibrillation. Valvotomy treats patients with HF symptoms and with valve area $< 1.5 \text{ cm}^2$. MVR is used in patients whose valves have been distorted by previous procedures or in patients who surgeons believe will not improve with valvotomy.

SCRIPT

Patient with h/o CHD presents with gradual:

- Decreased exercise tolerance due to fatigue
- Dyspnea
- Hyperdynamic precordium, displaced to the left
- Holosystolic murmur, loudest over the apex, with radiation to the axilla; murmur increases with handgrip
- $\pm S_3$

What is the diagnosis?

Diagnosis is **chronic mitral regurgitation**.

The holosystolic MR murmur often obscures both S_1 and S_2 . An S_3 sometimes is present, with the murmur + S_3 sounds mimicking "wow-duh." Know that if the MR is due, in part, to mitral valve prolapse, the clinical scenario could include a midsystolic click that precedes the mitral murmur. If the patient has LV systolic dysfunction, the case could include signs/symptoms of biventricular failure and pulmonary HTN. Any patient with pulmonary HTN, regardless of cause, will have a widely split S_2 with an increased P_2 sound.

Dx: Doppler echo.

Tx: Depends on cause; anticoagulate patients who have comorbid AF. MR associated with left ventricular systolic dysfunction can be treated with routine management of HF: Diuretics + afterload reduction $\pm$ inotropes $\pm$ biventricular pacing. For patients with nonischemic MR, surgery usually is performed at symptom onset using a reconstruction technique, as opposed to MVR. Ischemic MR often is treated with an MV repair at the time of coronary revascularization.

SCRIPT

Healthy female patient, age 35 years, with h/o prolonged episodes of atypical, substernal chest pain (CHD excluded with stress testing) has the following on PE:

- Systolic click(s) near S_1 , audible after the carotid upstroke is visible, when standing
- $\pm$ High-pitched, late systolic murmur, loudest at the apex, “whooping” in character, diminished with squat

What is the likely diagnosis?

Diagnosis is **mitral valve prolapse**.

MVP is associated with connective tissue disorders, such as Marfan's, OI, and Ehlers-Danlos. Rarely MVP occurs after rheumatic heart disease, with CHD, and after cardiomyopathies. Usually, however, MVP is idiopathic. The finding that the systolic clicks move closer to S_1 in times of decreased ventricular volume (e.g., standing) helps you differentiate these clicks from other systolic sounds, such as a split S_2 . Ejection clicks not associated with MVP usually occur very near to S_1 and before the carotid upstroke. Most patients are asymptomatic throughout life, but some may present with severe MR after rupture of the chordae or with endocarditis.

Dx: Doppler echo.

Tx: Beta-blockers for the patient with atypical chest pain; MV repair often is done for patients with symptomatic, severe MR. Endocarditis prophylaxis is necessary only if the patient has had endocarditis in the past.

SCRIPT

Injection drug user presents with 1-week h/o:

- Fever, cough, and pleuritic chest pain
- Abdominal pain and fullness
- ↑ JVP, more marked with inspiration
- Faint holosystolic murmur at midsternum
- Pulsatile hepatomegaly
- Lower extremity edema
- CXR: Diffuse nodular pulmonary infiltrates

What is the diagnosis?

Diagnosis is **tricuspid endocarditis**.

Injection drug users often have disease limited to the tricuspid valve and present with either no murmur or only a faint one. Septic emboli to the lungs are common, however, and present as pleuritic chest pain and cough. This case includes evidence of right heart failure. IDUs with right-sided disease usually are infected with *S. aureus*. Polymicrobial disease does occur; left-sided disease is more complex, with unusual organisms; e.g., *Pseudomonas*, *Candida*, *Bacillus*.

Dx: Clinical + microbiologic + echocardiographic + pathologic (collectively, the Duke criteria); low-risk patients with low-clinical probability of disease can be imaged with transthoracic echo, but high-risk patients (and those difficult to image across the chest) and those with high-clinical probability of disease should be imaged initially with transesophageal echo.

Tx: For disease isolated to the right side and caused by methicillin-sensitive *S. aureus*, nafcillin (not vancomycin!) + gentamicin can be given x 2 weeks. Persistent fever or multiple emboli (as in this case) require the duration be adjusted to 6 weeks. Right-sided MRSA should be treated with vancomycin or daptomycin (6 mg/kg/day) x 4 weeks.

SCRIPT

Stable patient with COPD on chronic oxygen, inhaled steroids, long-acting bronchodilators, short-acting beta-agonists, and theophylline presents with:

- Palpitations
- Heart rate > 100
- ECG: 3 distinct different P-wave morphologies

What is the diagnosis?

Diagnosis is **multifocal atrial tachycardia (MAT)**.

Patients with lung disease, such as COPD, are at risk for MAT, but know that theophylline use can trigger ectopic foci.

Dx: ECG with ventricular rate 100–150, 3 different P-wave morphologies, and 3 different PR intervals.

Tx: Maximize treatment of underlying pulmonary disease; verapamil sometimes is helpful if the patient is uncomfortable and can tolerate the negative chronotropic effect.

SCRIPT

Male patient, aged 20–40 years, with FH of sudden cardiac death presents with:

- Fatigue
- Exertional dyspnea $\pm$ chest pain with exertion $\pm$ palpitations
- Left ventricular lift
- Harsh, systolic, crescendo-decrescendo murmur at LLSB (decreases with squatting & handgrip; increases with Valsalva)

What is the diagnosis?

Diagnosis is **hypertrophic cardiomyopathy**.

These patients may have no symptoms at all for years. The key to this script is the murmur description and the history of sudden death of a relative. HCM often is autosomal dominant in inheritance and is the lesion most often found in athletes who die of sudden death.

Dx: ECG (shows LVH with septal Q waves) + Doppler echo.

Tx: Beta-blockers or verapamil (decrease heart rate and allow longer time for diastolic filling, but unknown whether drugs decrease progression of HCM if patient is asymptomatic) ± amiodarone to control arrhythmias.

SCRIPT

Patient with a recent h/o CHD and CABG presents with days-to-weeks of:

- Fatigue
- Recurrent chest discomfort
- Fever
- Leukocytosis with increased CRP
- $\pm$ Pericardial friction rub
- CXR: Increased cardiac silhouette

What is the diagnosis?

Diagnosis is **postpericardiotomy syndrome**.

If the history of recent CABG was not included, you might guess "acute pericarditis." The recent surgery is key to this script. Think about postpericardiotomy as similar to postmyocardial infarction (Dressler) syndrome. It can occur even in relatively minor procedures that tinker with the pericardium, even if no cutting is done on the heart; e.g., PCTA or insertion of pacer leads.

Dx: Clinical + echo.

Tx: Aspirin or ibuprofen (note: Only aspirin is recommended in Dressler's); short course systemic corticosteroids for refractory cases. Colchicine sometimes is used as prophylaxis post-procedure.

SCRIPT

Patient with recent h/o ischemic MI presents with days to weeks of:

- Fatigue
- Recurrent chest discomfort
- Fever
- Leukocytosis
- $\pm$ Pericardial friction rub
- CXR: Increased cardiac silhouette

What is the diagnosis?

Diagnosis is **Dressler syndrome**.

Postmyocardial infarction syndrome is another name for Dressler's; and with postpericardiotomy syndrome, the two entities are often referred to as pericardial injury syndromes. Recognize that postpericardiotomy syndrome and postmyocardial infarction syndrome are essentially the same: Pericardial effusion with fever and inflammation within days to weeks after the event.

Dx: Clinical + echo.

Tx: Aspirin; short course systemic corticosteroids for refractory cases.

SCRIPT

Patient presents with acute onset:

- Fever
- Chronic, pleuritic chest pain that can radiate to the left arm and neck and is improved with leaning forward
- An audible scratch, loudest at the L sternal border
- Modest increase in serum troponin and CK-MB
- ECG: Normal voltage, depressed PR intervals, diffuse ST-segment elevation
- CXR: Normal cardiac silhouette

What is the diagnosis?

Diagnosis is **acute pericarditis**.

Differentiate acute pericarditis from myocardial infarction by the prolonged nature of the pain and the diffuse elevation of ST segments, as opposed to only elevation in a coronary artery distribution.

Dx: Clinical + ECG + bedside echo.

Tx: Bed rest and NSAID (aspirin, indomethacin, or ibuprofen) with gradual wean after a week of treatment; systemic corticosteroids are used if the pericarditis is related to an underlying connective tissue disease, such as lupus.

Dermatology

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SCRIPT

Adolescent with asthma presents with:

- Long-standing intermittent, pruritic, papulosquamous eruption over the antecubital fossae and behind the knees
- Worse after hot showers

What is the diagnosis?

Diagnosis is **atopic dermatitis (eczema)**.

Clues here are the association with asthma, worsening with hot water, and the location of the scaly rash: Flexural areas. This is classic eczema. The majority of cases present before age 5 years, and ~ half will have this disease as adults. However, clinical presentation changes slightly, and disease is often concentrated on the hands or manifests as lichen simplex chronicus (lichenified plaques due to constant scratching). The majority also is associated with allergic rhinitis and/or asthma.

Dx: Clinical.

Tx: Avoid irritants and moisturize; topical antiinflammatories are used for exacerbations (e.g., corticosteroids, and rarely, tacrolimus or pimecrolimus in severe cases); antihistamines control the itch. Systemic steroids are not recommended because patients can have a rebound rash, worse than the initial presentation.

SCRIPT

Adult patient complains of:

- "Dandruff"
- Scaly rash around the nose and in the eyebrows with underlying redness when scales are removed
- Same scaly rash on the chest and in the axillae and groin, which may or may not itch

What is the diagnosis?

Diagnosis is **seborrhea**.

Know that seborrhea also can present in the eyebrows and lashes and in facial hair. Patients with HIV/AIDS can have a much worse presentation than immunocompetent patients. However, most patients with seborrhea, even on the chest and in the skin folds, have no underlying diagnosis.

Dx: Clinical.

Tx: Topical corticosteroids $\pm$ topical antifungal (ketoconazole); antidandruff shampoos for scalp or topical corticosteroid shampoos for severe cases; do not use potent corticosteroid creams on the face because they cause atrophy of the skin. Topical calcineurin inhibitors (tacrolimus and pimecrolimus) can be used as steroid sparing agents.



SCRIPT

Patient develops:

- Itchy, papulosquamous rash on the abdomen: Scaly well-circumscribed lesion at the area of the belt buckle

What is the diagnosis?

Diagnosis is **contact dermatitis**.

Know the common triggers for contact dermatitis: Plants (poison ivy and oak), nickel jewelry or clothing adornments, certain perfumes, rubber, and synthetic shoe chemicals. Clues include a rash located right under one of these triggers, such as earrings, flip flops, or belt buckles. Areas typically are well-demarcated. Contrary to popular myth, the blister fluid in cases of poison ivy/oak does not contain the urushiol resin and is not capable of inciting a response.

Dx: Clinical.

Tx: Remove irritant; topical corticosteroids; systemic corticosteroids in severe cases (especially dermatitis on the face).

SCRIPT

Adolescent develops:

- Erythematous, nodular, painful papules and pustules on the face, thorax, and back
- Multiple open and closed comedones and inflamed, deep nodular lesions on the forehead, cheeks, thorax, and back

What is the diagnosis?

Diagnosis is **acne vulgaris**.

This one is too easy because the script includes the words "comedones." This case would ordinarily include a photograph, which is easy to diagnose. Know that very severe nodular acne with development of sinus tracts is termed "acne conglobata." It usually occurs in young males on the chest and back.

Dx: Clinical.

Tx: Minimize friction in acne-prone areas (e.g., chin straps, baseball caps); discontinue aggravating factors (e.g., topical corticosteroids, industrial compounds, certain OCPs, lithium, phenytoin, phenobarbital); comedonal acne (noninflammatory)—topical retinoids are the drugs of choice (adapalene, tazarotene); mild inflammatory acne—topical retinoids, topical benzoyl peroxide + topical erythromycin or clindamycin. Combination of the latter two decreases development of resistance. Add oral systemic antibiotics (a tetracycline) for moderate-to-severe inflammatory acne in addition to topical retinoids. Nodulocystic acne: Oral agents such as antibiotics and isotretinoin are used. SE of isotretinoin: Teratogenicity, hypertriglyceridemia, depression, and pseudotumor cerebri (especially when used with tetracyclines).



SCRIPT

Middle-aged female complains of:

- “Acne” on the cheeks
- Repeated eruptions of facial flushing and erythematous papular lesions (worse with exercise, alcohol, spicy foods, hot drinks, sun exposure, and emotional situations)
- Multiple small papules on the cheeks without comedones
- Scattered telangiectasias
- ± Blepharitis, chalazion, iritis, or keratitis

What is the diagnosis?

Diagnosis is **rosacea**.

Clues: Lack of comedones (helps you distinguish from acne vulgaris), flushing with alcohol, and presence of telangiectasias. Disease of adults only. More severe disease in men, but more common in women.

Know association between rosacea and ocular disorders (keratitis, iritis, blepharitis, and chalazion).

Dx: Clinical.

Tx: Topical metronidazole or oral antibiotics for severe disease (tetracycline, doxycycline, or minocycline); laser therapy for telangiectasias. Topical corticosteroids worsen disease.



SCRIPT

Obese patient presents with:

- Polyuria
- Velvety, pigmented rash in folds of the neck and axillae
- Fasting plasma glucose > 125 mg/dL

What is the name of the rash?

The name of the rash is **acanthosis nigricans**.

This rash could also be presented in the context of a GI or lung malignancy. The malignant acanthosis nigricans is severe and progressive and is most commonly associated with gastric adenocarcinoma. Acanthosis nigricans is also associated with several endocrinopathies, including diabetes, thyroid disease, and Cushing's.

Dx: Clinical + assess for insulin resistance and consider occult malignancy if very severe and/or progressive, especially in a non-obese/nondiabetic older adult.

Tx: Treat underlying disorder.



SCRIPT

Known diabetic presents with:

- Painless, yellowish, irregular plaques with purplish pigment at the edges over both shins

What is the diagnosis?

Diagnosis is **necrobiosis lipoidica diabetorum**.

You might have guessed erythema nodosum because of the location on the shins. Be careful about making loose associations such as that. Erythema nodosum lesions are painful, erythematous nodules that eventually become bruises. These are flat, yellowish plaques.

Dx: Clinical.

Tx: Treat underlying diabetes; consider topical or intralesional corticosteroids in difficult cases.



SCRIPT

Patient with HIV/AIDS is:

- Prescribed TMP/SMX for presumed *Pneumocystis* infection
- 2 days later → fever and painful diffuse, erythematous, blistering rash on < 10% of body surface area (BSA), including mucus membranes of the mouth and conjunctiva

What is the diagnosis?

Diagnosis is **Stevens-Johnson syndrome**.

Drugs are the most common trigger, including a variety of antibiotics, allopurinol, antiepileptic drugs (especially phenytoin and carbamazepine), and NSAIDs. Less commonly, SJS is associated with infections. Other blistering lesions could be considered (pemphigus), but the history of drug exposure practically excludes it from the diagnosis. Skin sloughing of > 30% of BSA would be considered toxic epidermal necrolysis. SJS affects less than 10% of the BSA. When 10%-30% of the BSA is involved, it is considered SJS-TEN overlap. The lack of distinct target lesions excludes erythema multiforme major.

Dx: Clinical + biopsy (shave or punch).

Tx: Discontinue offending drug; supportive care in a burn unit; IVIG and systemic steroids are controversial.



SCRIPT

Young patient presents with:

- Asymptomatic rash on the back ~ 1 week after circular, salmon-colored, scaly patch on the chest
- Multiple plaques on the back with long axis oriented in direction of skin lines in a “Christmas tree” distribution

What is the diagnosis?

Diagnosis is **pityriasis rosea**.

This case clearly describes a herald patch followed by a diffuse eruption. Often an exam will show you photos of the herald patch in the context of the rash that follows. All the lesions typically have a "collarette of scale" at the margin.

Dx: Clinical + exclude dermatophyte (tinea) infections and secondary syphilis.

Tx: Reassurance + antihistamines or low potency topical steroids for pruritis.



SCRIPT

Sexually active adult presents with:

- Pain in the genital region
- Rash on the forearm
- Multiple small, painful blisters on the external genitalia with surrounding erythema
- Several small, target-shaped lesions on forearm without scale or itch
- No mucosal lesions

What is the name of the rash on the forearm?

The name of the rash on the forearm is **erythema multiforme**.

EM major includes mucosal involvement, where EM minor is skin involvement only. This case presents erythema multiforme in the context of a herpes simplex infection (most common cause). EM lesions could show up in a clinical scenario of *Mycoplasma pneumoniae* or secondary to certain drugs. The target lesions with or without mucosal involvement are classic.

Dx: Clinical with biopsy of suspicious cases.

Tx: Supportive; treatment may involve antimicrobial therapy if a causative organism is found (e.g., symptomatic *Mycoplasma* infection), or removal of an offending medication. Herpes-associated EM is often recurrent, and patients may benefit from suppressive antiviral therapy. Systemic steroids are often prescribed, but robust data regarding their effectiveness are lacking.



SCRIPT

Patient with HCV presents with:

- Blistering lesions on the dorsum of the hands that began as erythematous macules with adherent scale
- Intermittent sun exposure for the past month
- Increased hepatic transaminases
- ↑ Urine uroporphyrin levels

What is the diagnosis?

Diagnosis is **porphyria cutanea tarda**.

PCT is caused by a congenital or acquired decreased activity of uroporphyrinogen decarboxylase (UROD), which allows a buildup of phototoxic porphyrins in the skin. It is most strongly associated with HCV, but can be seen in HIV and hereditary hemochromatosis. Any time a patient with HCV presents with a photosensitive rash isolated to the hands, think of this entity. The clinical scenario may or may not give you the elevated urine uroporphyrin levels, but that is the method for making the definitive diagnosis. Lesions can be scaly macules, vesicles, or hemorrhagic bullae and can occur in any sun-exposed area.

Dx: Clinical + measurement of urine uroporphyrins (increased) + assessment for HCV, HIV, and hereditary hemochromatosis.

Tx: Repeated phlebotomy (lowering iron stimulates activity of UROD) and treat underlying condition (HCV); avoid excess alcohol intake, estrogens, and inhalation of chlorinated polyaromatic hydrocarbons (fungicides/pesticides). Antimalarials are also effective and are used when phlebotomy is contraindicated.



SCRIPT

Female patient presents with h/o recurrent axillary nodules for years develops:

- Pain in both axillary regions x ~ 2 months—began as small “bumps” but getting larger
- Significant pain and erythema around the bumps x 24 hours
- Deep, nodular lesions in both axillae without any central area of necrosis
- Few comedones in the axillae

What is the diagnosis?

Diagnosis is **hidradenitis suppurativa**.

Don't confuse this case with boils (furuncles) or acne conglobata. Boils usually are not symmetric, and HS lesions are found in typical areas where sweat glands are abundant (axillae, inguinal region, and inner thighs). Lesions usually start in adolescence and persist as round, deep, inflammatory nodules, whereas boils develop a pointed center, where underlying central necrosis is found. Acne conglobata does not affect the axillae. Don't be confused because the case includes the word "comedones." Comedones are often seen in hidradenitis cases. Hidradenitis is classically bilateral and most often affects the armpits. The chronicity of disease is key.

Dx: Clinical.

Tx: Weight loss and smoking cessation, if applicable; breathable clothing; avoid washcloths, depilatory creams/lotions, and shaving of the region; use gentle soaps; antiperspirants are OK, so long as doesn't irritate; antibiotics, if cellulitis present; surgical incision and drainage, when necessary; immunomodulators or systemic retinoids are used in very severe disease (corticosteroids, infliximab or adalimumab, cyclosporin, isotretinoin).

SCRIPT

Patient presents with:

- Weight loss over 3 months
- Intermittent fevers
- Bilateral white plaques on the lateral aspect of the tongue that cannot be removed with a tongue depressor
- + HIV EIA and Western blot

What is the name of the white lesions? What causes them?

The white lesions are called **hairy leukoplakia**. They are caused by **Epstein-Barr virus**. Differentiate these plaques from those of candidal thrush, which also appears as whitish plaques but can be removed with a tongue depressor and exposes an erythematous base. Often *Candida* is found throughout the mouth, not only on the lateral tongue. Oral hairy leukoplakia also can be found in other parts of the mouth, but uncommonly so. Leukoplakia also can occur as a precancerous condition in patients with risk factors for mouth cancer, but it is not caused by EBV in those situations. In HIV/AIDS, oral hairy leukoplakia is not premalignant.

Dx: Clinical.

Tx: No treatment usually necessary. Lesions often spontaneously resolve. If treatment warranted for cosmetic reasons, acyclovir can be used. If HIV+, treatment with antiretroviral therapy will eliminate.



SCRIPT

Patient presents complaining of:

- Intermittent mild pain and burning on the tongue
- Variable, raised, yellow pattern on the tongue that changes position

What is the diagnosis?

Diagnosis is **geographic tongue**.

There are no other diagnoses that include a migratory tongue pattern. This is the only one! Usually the exam will show you a photo.

Dx: Clinical.

Tx: Reassurance.

SCRIPT

Elderly patient presents with an itchy recurrent skin rash:

- Pruritic papulosquamous lesions in the right axilla and antecubital fossa
→ vesicles and bullae mostly intact
- Lesions are not symmetric and do not always occur in the same place
- Normal mucosal surfaces
- Improvement with potent topical corticosteroid

What is the diagnosis?

Diagnosis is **bullous pemphigoid**.

This is a hard one because typically all bullous lesions will get biopsied before you make a diagnosis. Bullous pemphigoid, however, is increasing in incidence, so it is probably appropriate for you to remember its classic clinical features: Onset in older persons and intensely pruritic bullae that improve with topical corticosteroids. Dermatitis herpetiformis could look similar, except that typically, it is not restricted to flexural areas (biopsy is needed for definitive exclusion) and is often presented in the context of celiac disease. It's reasonable to remember the biopsy findings in the event they are included in a clinical scenario.

Dx: Skin biopsies for light microscopy (subepidermal blister with inflammatory cells in superficial infiltrate) and direct immunofluorescence shows linear deposition at the basement membrane. BP antibodies (BP180 and BP 230) can be measured with ELISA with good sensitivity and specificity, but test is rarely available.

Tx: Systemic corticosteroids are first-line treatment, although topical steroids can be used in mild disease. Immunosuppressants are often used as steroid sparing agents.



SCRIPT

Middle-aged Caucasian woman presents with:

- Skin lesion on her thigh
- History of extensive sun exposure as a child with repeated sunburns
- Flat asymmetric, pigmented lesion that lacks uniform color and is ~ 8 mm in size
- Enlargement of the lesion over the past few months

What is the diagnosis?

Diagnosis is **melanoma**.

Remember the ABCDE features of melanoma: **A**symmetry, **B**order irregularities, **C**olor variegation, **D**iameter greater than 6 mm, **E**nlargement or evolution of color change, shape, or symptoms. There are 4 types: Superficial spreading, lentigo maligna, acral lentiginous (palms, soles, nails, and mucosa), and nodular. Nodular is the only one of the 4 types that does not exhibit radial growth; instead, it grows deeply vertical, with an increased incidence of early metastases.

Dx: Excisional skin biopsy.

Tx: Based on staging; surgical excision with wide margins $\pm$ sentinel lymph node biopsy. Regional mets treated with resection and adjuvant radiation (reduces local occurrence); adjuvant interferon $\alpha 2b$ x 1 year for stage III and higher disease. Distant mets (stage IV disease) is incurable with survival average 6–15 months.



SCRIPT

Patient is prescribed doxycycline for empiric treatment of community-acquired pneumonia and, after 3 days, develops:

- A large erythematous, burning, annular plaque in the genital region (that may develop a central blister)
- Same rash occurred in the same location when given doxycycline as an adolescent for acne
- Lesion resolves upon discontinuation of the antibiotic

What is the diagnosis?

Diagnosis is **fixed drug eruption**.

The clue to this case is the appearance of the same rash in the identical location each time the patient is given a particular drug. FDEs often occur in the genital region. The lesions can be multiple especially with repeated exposure to the offending drug.

Dx: Clinical.

Tx: Stop the offending drug; reassurance.

SCRIPT

20-something-year-old patient develops:

- Bilateral itchy, erythematous plaques on knees and elbows with an adherent silvery scale that bleeds when removed; present > 1 year
- Similar plaques on the scalp
- Multiple tiny pits in the nail beds

What is the diagnosis?

Diagnosis is **plaque psoriasis**.

Clues are the nail pits and the chronic, symmetric nature of the plaques on extensor surfaces. Other nail findings can include onycholysis, thickening, and subungual hyperkeratosis. Don't forget about the association of psoriasis with spondyloarthropathies (~ 1/3 of patients will have it). "Classic" presentation is symmetric DIP arthritis but also can see asymmetric arthritis with a "sausage digit."

Dx: Clinical.

Tx: Moisturization and topical corticosteroids; side effects include tachyphylaxis and skin atrophy. Topical calcineurin inhibitors (tacrolimus or pimecrolimus) can be used on more sensitive areas, such as the face and genitalia. Other options include topical vitamin D analogues (calcipotriene) and/or topical retinoids (tazarotene). UV phototherapy good for widespread plaques. Oral immunomodulators are sometimes used in severe cases; methotrexate, cyclosporine, and TNF inhibitors. Because sudden withdrawal of systemic corticosteroids can lead to the development of pustular psoriasis, so they are generally not used.



SCRIPT

Previously healthy female patient presents with:

- Fever
- Sore throat
- 3 weeks of painful, erythematous or violaceous nodules on shins that become bruises

What is the diagnosis?

Diagnosis is **erythema nodosum**.

Bilateral painful nodules over the shins are always going to be EN. But EN is associated with many diseases, so it could be couched in a lot of different clinical scenarios. Pharyngitis is the most common association, often due to group A strep, but not always. Other classic infectious associations include *Coccidioides immitis*, *Histoplasma capsulatum*, and tuberculosis. If hilar adenopathy is part of the script, think sarcoidosis. If diarrhea/abdominal pain are present, think about inflammatory bowel disease. Be aware of the association with Behçet's too (mucocutaneous ulcers). However, the case could be just EN because 75% of cases are idiopathic.

Dx: Clinical.

Tx: Supportive; treat underlying disease.

SCRIPT

Patient with active ulcerative colitis presents with:

- Pretibial sore that began as an erythematous pustule → nodule → ulcer, ragged with purple, raised border
- Skin biopsy: Tissue necrosis with neutrophilic infiltrate
- Cultures: Staph species but no fungi or acid-fast bacteria

What is the diagnosis?

Diagnosis is **pyoderma gangrenosum**.

The clues here are the presence of inflammatory bowel disease and the neutrophilic infiltrate on biopsy of the skin lesion. Always think about the presenting complaint in light of the comorbid diseases and past medical history. Know the association between inflammatory bowel disease and pyoderma gangrenosum. Other associations with PG include Sweet's, Behçet's, and Sjögren's. The negative cultures exclude the ulcer as being caused by an infection.

Dx: Skin biopsy to exclude other causes; bacterial, fungal, and mycobacterial cultures; basic lab tests that narrow the differential diagnosis.

Tx: Treat the underlying disease; usually high-dose prednisone for several weeks is required to heal the skin lesion. Immunomodulators and surgery are sometimes required.

SCRIPT

Patient presents with:

- Pain with walking
- Multiple raised verrucous growths on the heels and balls of the feet that obscure the normal skin markings and are painful when palpated

What is the diagnosis?

Diagnosis is **plantar warts**.

Clues are the presence of the warts on the weight-bearing parts of the feet, the verrucous appearance, and the disruption of normal skin lines.

Dx: Usually clinical; shave biopsy when diagnosis is unclear.

Tx: Most warts will spontaneously regress within ~ 2 years. If requires treatment, use non-scarring methods because scars on the soles of the feet are painful. Options include topical agents, such as salicylic acid, trichloroacetic acid, and cantharidin, or freezing with liquid nitrogen.



SCRIPT

Sexually active patient presents complaining of:

- Multiple painless, cauliflower-like, verrucous, lesions on the external genitalia

What is the diagnosis?

Diagnosis is **condylomata acuminata**.

These genital wart lesions of HPV are very easy to recognize. Occasionally they can be confused with condyloma lata of secondary syphilis. Condyloma lata are flat, wet lesions without any verrucous features. Some of the HPV subtypes that cause condylomata acuminata also can cause cervical cancer (especially 16 and 18), but other subtypes (6 and 11) cause warts only. The appearance of condylomata acuminata can vary slightly from smooth to verrucous flesh-colored or pink lesions.

Dx: Clinical with biopsy of suspicious lesions.

Tx: Large lesions usually require surgical excision (if > 1 cm at the base). Cryotherapy with liquid nitrogen is another option. Small warts can be treated topically with trichloroacetic acid or podophyllin in a practitioner's office. Self-treatment with podofilox or imiquimod can be done at home in affected areas after initial treatment.



SCRIPT

Patient presents with:

- Multiple, painless, clustered papules with a central umbilication on the arm (or anywhere on the body)

What is the diagnosis?

Diagnosis is **molluscum contagiosum**.

Clue here is the term "central umbilication." Molluscum lesions are dome-shaped lesions that have a classic depression in the center. The lesions can be very large and numerous in patients with HIV/AIDS.

Dx: Clinical; biopsy of suspicious lesions.

Tx: Cryotherapy with liquid nitrogen; surgical curettage; application of cantharidin at practitioner's office. Antiretroviral treatment helps those with HIV infection.



SCRIPT

Elderly African-American male patient presents with alopecia since getting his hair cut with an electric razor:

- Annular scaly patch of hair loss
- Small black dots over the hair follicles
- Palpable small posterior cervical lymph nodes

What is the diagnosis?

Diagnosis is **tinea capitis**.

Clues here are the words "elderly, African-American male," "razor," and "black dots." Elderly patients, especially African-Americans, are those most commonly infected, and infection often occurs at barber shops after a haircut using an unclean razor. The fungal organisms that cause tinea infections are called "dermatophytes" (*Epidermophyton*, *Trichophyton*, and *Microsporum* species).

Dx: Clinical + KOH prep on hair to identify fungal spores on the shaft + fungal culture (Sabouraud's medium); avoid empirically treating without doing a culture.

Tx: Oral antifungal (griseofulvin, terbinafine, itraconazole, fluconazole); topical treatments are ineffective for tinea capitis. Remember, nystatin does not treat dermatophyte infections, only candida. Counsel close contacts not to share fomites (hair brushes, hats). Corticosteroids are added when kerion (an intense inflammatory reaction resulting in a boggy and tender lesion) is present.



SCRIPT

Patient presents with:

- Annular scaly rash on the arm, present since week after getting new cat
- Clear toward the center of rash with raised advancing erythematous margin and scale

What is the diagnosis?

Diagnosis is **tinea corporis**.

The obvious clue here is the cat. Instead of including the cat exposure, a case could include exposure to an infected close contact, or skin exposure to a wrestler with tinea corporis ("tinea gladiatorum"). Tinea corporis is frequently confused with the herald patch of pityriasis rosea and with granuloma annulare. Itch is a differentiating factor (present in tinea), and GA lacks scale. Nummular eczema also is similar. Assessing the scale under the microscope for fungal hyphae is helpful to differentiate from noninfectious scaly rashes, like nummular eczema.

Dx: Clinical + KOH prep on scale shows fungal hyphae + fungal culture (in severe cases).

Tx: Topical or systemic antifungal, but remember that nystatin is ineffective against dermatophytes.

An oral agent is recommended to treat wrestlers, and they should abstain from the sport for ~ 10 days.



SCRIPT

Patient who wears heavy shoes and goes to the gym presents with:

- Itchy rash between the toes
- Multiple, intensely pruritic, pinpoint erythematous vesicles between the toes

What is the diagnosis?

Diagnosis is **tinea pedis**.

The case could present a more advanced case where, instead of vesicles, the patient has nail thickening and itching. Dyshidrotic eczema can appear similar.

Dx: Clinical + KOH prep to distinguish from dyshidrotic eczema. Fungal culture in difficult cases.

Tx: Topical or oral antifungal, but remember that nystatin is ineffective against dermatophytes.

A prolonged course of oral therapy is required if the nails are involved.



SCRIPT

Dark-skinned individual presents with:

- Numerous scaly hypo- and hyperpigmented areas across the chest with a fine scale
- No large isolated patch
- No itching
- KOH stain: "Spaghetti and meatball" elements

What is the diagnosis? What is the associated microorganism?

Diagnosis is **tinea versicolor**. The associated microorganism is the fungus, **Malassezia**. In spite of the name "tinea," this rash is not caused by a dermatophyte-type fungus, and TV is **not** contagious. The scenario could present either uniform hypopigmentation or hyperpigmentation and might emphasize that hypopigmented rashes are worse in the summer. The question could show you a photo of the fungal scraping and ask you what organism is associated with the obvious fungal hyphae and yeast cells (in the "spaghetti and meatball" pattern). Always think about secondary syphilis when you see a disseminated rash on the skin, regardless of scale. The script includes the KOH prep to give you the diagnosis here.

Dx: Clinical + KOH prep showing fungal hyphae and yeasts.

Tx: Topical antifungals (selenium sulfide, ketoconazole shampoo) or oral antifungals (ketoconazole, itraconazole, and fluconazole).



SCRIPT

Adolescent from a group home presents with:

- Scalp itching
- Erythema at the base of the scalp
- Mild bilateral posterior auricular lymphadenopathy
- Wood's lamp: Small areas of pale blue fluorescence at base of multiple hair shafts

What is the diagnosis?

Diagnosis is **pediculosis capitis (head lice)**.

Not all patients have scalp itching. The case may not give you the Wood's lamp findings. Instead, you may be shown a photo of nits (eggs) and a louse.

Dx: Clinical (visualize louse or nits on comb).

Tx: Topical permethrin, malathion, benzyl alcohol, pyrethrin + piperonyl butoxide, ivermectin or spinosad. Lindane is an older treatment that is not recommended because of its association with neurologic side effects. Wash and dry patient's clothing and fomites with high heat. Remove nits with a fine tooth comb after application of treatment.

Head Lice Fun Facts:

The louse doesn't jump or fly!

An adult louse can live up to 55 hours without a host! (They get very dehydrated, though.)

Nits can be on the scalp for months after treatment!

Permethrin is synthesized from chrysanthemums!



SCRIPT

Young, sexually active adult presents with:

- Itching in the pubic region
- Multiple small bluish macules along the upper abdomen and in the inner thighs
- Palpable small inguinal lymph node

What is the diagnosis?

Diagnosis is **pediculosis pubis (pubic lice)**.

Not much else causes diffuse groin itching. These lice are usually transmitted sexually. The bluish macules (maculae ceruleae) are not always present—they tend to be visible in patients who have been infested for a prolonged period. Scabies would be an alternate diagnosis, but itching would be seen in other parts of the body as well.

Dx: Clinical (visualized louse or nits).

Tx: **Similar to that of head lice** (topical permethrin cream rinse, etc).



SCRIPT

Nursing home patient is brought for evaluation of:

- Itching, worse at night, x ~ 1 month
- Multiple excoriations in both axilla and groin, on the wrists, and between the fingers

What is the diagnosis?

Diagnosis is **scabies**.

The clinical scenario case may describe the classic mite burrow, or show you a photograph, although burrows are uncommonly seen in clinical practice. Recognize scabies by the intensity of itching (causing excoriations and usually worse at night) and the distribution (especially prominent in axillary regions, flexor aspect of wrists, and interdigital webs).

Dx: Clinical + evaluation of scrapings in mineral oil for mites, eggs, or feces (low sensitivity).

Tx: Topical permethrin 5% cream from neck to soles, even under finger and toenails, then wash off 8–14 hours later; antihistamines prn itching. A second dose of permethrin in 7 days is recommended. Use oral ivermectin for severe or recalcitrant cases with a repeat dose in 2 weeks. Permethrin can be used in pregnancy. Treat all family members at the same time.



SCRIPT

Middle-aged Caucasian woman presents with:

- Skin lesion on her forehead
- History of extensive sun exposure as a child with repeated sunburns
- Flesh-colored papular lesion with a pearly sheen and multiple telangiectasias

What is the diagnosis?

Diagnosis is **basal cell carcinoma**.

Buzzwords in this case are recurrent sun exposures and pearly papule on the face. Basal cell most often presents exactly as in this case. Some lesions may ulcerate. This cancer is rarely seen in dark-skinned individuals.

Dx: Skin biopsy.

Tx: Electrodesiccation and curettage; excision; cryo- or radiation therapy; Mohs; topical immunomodulation (5-fluorouracil, imiquimod).



SCRIPT

Middle-aged Caucasian woman presents with:

- Skin lesion on her forehead
- History of extensive sun exposure as a child with repeated sunburns
- Multiple rough scaly patches on the forehead and dorsum of the hands
- One of the scaly patches on the forehead is associated with a firm hyperkeratotic macule

What is the diagnosis?

Diagnosis is **multiple actinic keratoses and squamous cell carcinoma in situ**.

Squamous cell cancers generally evolve from a preexisting AK lesion, so a clinical scenario cases for SCC often will present a history of AKs. The history of extensive sun exposure is important and points you to this diagnosis. Tumors on lips and ears have the highest rates of metastasis. Immunosuppression, such as seen in HIV/AIDS, is associated with a worse presentation and higher rates of metastasis.

Dx: Skin biopsy.

Tx: SCC treatment varies depending on the size and risk of metastasis; usually surgery, Mohs, or radiation (for non-surgical candidates). SCC *in situ* and AKs can both be treated with cryotherapy, topical 5-fluorouracil, or topical imiquimod. SCC *in situ* can also be excised.



Endocrinology

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SCRIPT

Healthy patient with no symptoms, and screening lab work shows hypercalcemia. Additional tests:

- Normal albumin
- Normal or $\uparrow$ iPTH

What is the diagnosis?

Diagnosis is **primary hyperparathyroidism**.

Any time the iPTH is increased in the setting of hypercalcemia, the diagnosis is primary hyperparathyroidism because all causes of hypercalcemia should negatively inhibit PTH production. Even if the iPTH level is in the normal range, the diagnosis is still primary hyperparathyroidism, because the iPTH should be undetectable (suppressed by the high calcium). Rarely, this disease can be confused with familial hypercalcemic hypocalciuria, which is a genetic condition that results in hypercalcemia. However, these patients have no features of hypercalcemia and long-standing high serum calcium levels.

Dx: Serum Ca + iPTH (normal or high) + imaging evaluation of parathyroids if surgery is planned.

Tx: Depends on manifestations; mild = observation; high calcium or symptoms = surgical resection.

SCRIPT

Patient presents with:

- Confusion or coma
- Plasma glucose < 55
- Consciousness and plasma glucose improve with IV administration of glucose
- During the episode: $\uparrow$ Insulin level
- Proinsulin = 10%
- Undetectable C-peptide

What is the diagnosis?

Diagnosis is **surreptitious insulin use**.

A good clue that you're dealing with some form of hypoglycemia is the presence of the "C-peptide" and "proinsulin" in the clinical scenario. We measure these when working up hypoglycemia and potential surreptitious insulin administration. Insulin, C-peptide, and proinsulin are normal or increased in insulinomas. Exogenous insulin intake is associated with increased insulin and low C-peptide levels.

Dx: Clinical + measurements of plasma glucose (normal), insulin (normal or high), and C-peptide (low) during a spell.

Tx: Psychiatric evaluation.

SCRIPT

Patient presents with episodes of:

- Anxiety
- Diaphoresis
- Fogginess that occurs during fasting and resolves with eating
- Plasma glucose during an episode < 55
- During hypoglycemia: Normal insulin level
- Proinsulin $> 20\%$
- Normal C-peptide

What is the diagnosis? What is the cause?

Diagnosis is **nonreactive (fasting) hypoglycemia** due to **insulinoma** (pancreatic tumor).

A good clue that you're dealing with some form of hypoglycemia is the presence of the "C-peptide" and "proinsulin" in the clinical scenario. We measure these when working up hypoglycemia and potential surreptitious insulin administration. Insulin, C-peptide, and proinsulin are normal or increased in insulinomas. Exogenous insulin intake is associated with increased insulin and low C-peptide levels.

Dx: Clinical + measurements of plasma glucose (low), insulin (normal or high), proinsulin (normal or high), and C-peptide (normal or increased) during a spell + localization of tumor with imaging (helical CT, MRI, or a variety of other specialized radiologic tests).

Tx: Surgical resection.

SCRIPT

Patient with advanced chronic kidney disease presents with:

- ↓ Ca
- ↑ PO₄
- ↑ Alkaline phosphatase
- Normal 25-(OH)₂-D and ↓ 1,25-(OH)₂-D
- ↑ iPTH

What is the cause of the increased iPTH?

The cause is **secondary hyperparathyroidism** due to **chronic kidney disease**.

The clues here are the history of chronic kidney disease and the normal level of 25-(OH)2-D. Since kidney patients cannot convert storage to active vitamin D, nor excrete phosphorus in the urine, they develop hypocalcemia and an increased iPTH.

Dx: Clinical + Ca (normal-low) + PO₄ (high) + iPTH (high) + 25-(OH)2-D (normal, if not vitamin D deficient) + 1,25-(OH)2-D (low).

Tx: Control hyperphosphatemia with diet and binders (calcium-based and noncalcium-based); begin noncalcium-based binder as soon as iPTH begins to rise, in patients with CKD. As the serum calcium falls with worsening disease, substitute the noncalcium-based binder with a calcium-based one.

SCRIPT

Elderly patient has:

- Proximal muscle weakness
- Pain in the pelvic girdle
- ↓ Serum Ca and PO₄
- ↑ Alkaline phosphatase
- ↓ 25-(OH)₂-D and normal or low-normal 1,25-(OH)₂-D
- ↑ iPTH

What is the cause of hypocalcemia?

The cause is **vitamin D deficiency**.

Poor bone mineralization due to this condition is called osteomalacia. Remember that the storage vitamin D is reduced in this condition, not the active. Storage is 25, and active is 1,25.

Dx: Clinical + 25-(OH)2-D.

Tx: Replacement of vitamin D with dose depending on degree of deficiency and underlying disease states.



SCRIPT

A patient with lung cancer has:

- ↑ Serum Ca and normal PO₄
- ↑ Alkaline phosphatase
- ↓ iPTH

What is the cause of the hypercalcemia?

The cause is **hypercalcemia of malignancy**.

The scenario could include measurement of PTHrP, which is increased in malignant hypercalcemia. But, you should know how to interpret the serum Ca and iPTH in malignancy. PTH-like peptides are produced by the malignancy and mimic the true molecule, but the high calcium inhibits iPTH production.

Dx: Clinical + Ca (high) + iPTH (low).

Tx: Treat the underlying malignancy + IVF if the hypercalcemia is associated with volume depletion + calcitonin to acutely reduce the serum Ca + bisphosphonates.

SCRIPT

Patient older than 50 years presents with:

- Fatigue
- Constipation
- Diffuse bone pain
- $\pm$ History of kidney stones
- $\uparrow$ Serum Ca
- DXA: T-score < -2.5
- Radiographs of the hands: Phalangeal subperiosteal bone resorption

What is the diagnosis?

Diagnosis is **primary hyperparathyroidism**.

In this script, you are not given an iPTH level and, instead, are asked to identify primary hyperparathyroidism by its classic presentation. If you are given hand radiographs to assess in a patient without renal disease, always consider primary hyperparathyroidism as a diagnosis. It is one of the few conditions where you'll be given hand radiographs. Rarely, this disease can be confused with familial hypercalcemic hypocalciuria, which is a genetic condition that results in hypercalcemia. However, these patients have no features of hypercalcemia and long-standing high-serum calcium levels.

Dx: Serum Ca + iPTH (normal or high) + imaging evaluation of parathyroids if surgery is planned.

Tx: Depends on manifestations; mild = observation; high calcium or symptoms = surgical resection.

SCRIPT

Healthy patient presents with:

- $\uparrow$ Ca on screening labs
- Family history: Relatives with hypercalcemia
- Normal or slightly $\uparrow$ iPTH
- Urine calcium < 200 mg/d

What is the cause of the hypercalcemia?

The cause is **familial hypocalciuric hypercalcemia**.

This condition mimics primary hyperparathyroidism, except urine calcium excretion in FHH is always low. And the clinical scenario usually will include a family history of disease or a history of long-standing hypercalcemia in the patient. This entity never has the features of primary hyperparathyroidism (bones, stones, moans, groans).

Dx: Clinical + iPTH + rate of urinary calcium excretion.

Tx: None required.

SCRIPT

Known diabetic presents with:

- Confusion
- Fever
- Tachycardia
- Increased deep respirations
- ↑ Blood glucose
- ↑ Anion gap
- ↓ Serum Na, K, and PO₄

What is the diagnosis?

Diagnosis is **diabetic ketoacidosis**.

Any diabetic who presents hyperglycemic with an increased anion gap has diabetic ketoacidosis until proven otherwise. Good rule to remember.

Dx: High anion gap metabolic acidosis in diabetic with hyperglycemia.

Tx: Initial fluid bolus and assessment of serum K and other electrolytes. If hypokalemic, do not give insulin until the serum K has been replaced to > 3.3 . Initiate regular insulin via continuous infusion then reduce its dose when the blood glucose falls to < 200 . After the initial fluid bolus of NS, replacement IVF (NS vs. 0.45% NS) should depend on the corrected serum Na. IVF should definitively be changed to D5 with 0.45% NS when the serum glucose falls to < 200 , and the insulin rate is decreased. Pay close attention to the serum PO₄ and replace when necessary. Give bicarbonate if the serum pH is < 7 . DKA is considered to be resolved when the serum anion gap is < 12 , and the patient is able to eat. The recommended algorithm for treatment is available on the American Diabetes Association website.



SCRIPT

Patient with +FH of MEN I develops:

- Diabetes
- Weight loss
- Chronic diarrhea
- A beefy-red tongue and cheilitis
- A painful, pruritic blistering rash

What is the diagnosis?

Diagnosis is **glucagonoma** (pancreatic tumor).

Dx: Clinical + serum glucagon concentration (> 500 pg/mL) + measurement of multiple molecular weight forms of glucagon + imaging to localize tumor (helical CT or MRI of abdomen) with biopsy.

Tx: Surgical resection, if localized. Difficult and specialized treatment, if metastases are present at diagnosis. All patients need good nutritional support.

SCRIPT

Obese patient has:

- A fasting plasma glucose of 100–125 or HbA1c 5.7–6.4% (or 2-hr plasma glucose 140–199 after 75-gram glucose load) on 2 separate occasions

What is the diagnosis?

Diagnosis is **prediabetes**.

Dx: Clinical + FPG 100–125 or HbA1c 5.7–6.4%, confirmed on at least 2 separate occasions.

Tx: Weight loss + control of blood pressure and hyperlipidemia.

SCRIPT

Young female with a history of other autoimmune diseases (e.g., chronic autoimmune hypothyroidism) develops:

- Amenorrhea
- Episodes of diaphoresis and heat intolerance
- Negative pregnancy test
- ↑ FSH and LH
- Normal TSH
- Normal prolactin

What is the diagnosis?

Diagnosis is **premature ovarian failure**.

The FSH and LH elevations tell you that the patient has ovarian failure. The question is whether it is normal menopause or premature. Her age is less than 40 years, so in this case, the diagnosis is premature ovarian failure. Remember the association between autoimmune disorders and development of premature ovarian failure. Work up any woman for this when she's had a disruption in her menstrual cycle for 3 consecutive months or more. Women with this condition are at increased risk for developing autoimmune adrenal insufficiency and should be screened.

Dx: Clinical + pregnancy test + serum prolactin + FSH and LH + TSH (if doesn't already have a diagnosis of hypothyroidism) + anti-adrenal and anti-21-hydroxylase antibodies (help to diagnose and predict autoimmune adrenalitis) + DXA scan.

Tx: Estrogen ± progestin replacement until age 51 years (unless there is contraindication, such as a family or personal history of breast cancer) + supplementation with Ca and vitamin D and treatment of osteoporosis, if applicable.

SCRIPT

Female with:

- Increased BMI > 30
- Acne
- Hirsutism
- Amenorrhea
- Fasting plasma glucose 100–125
- ↓ FSH, ↑ LH, FSH:LH > 2, slightly ↑ testosterone and DHEA

What is the diagnosis?

Diagnosis is **polycystic ovarian syndrome**.

Note the similarities between this syndrome and Cushing's in terms of the clinical presentations. PCOS does not have the hypokalemic metabolic alkalosis associated with Cushing's; and the LH:FSH ratio is an important diagnostic clue in the question. A Cushing's case probably will not include the FSH:LH ratio. Always interpret the BMI when it is provided, as it will always give you useful information. Remember that women in PCOS are at increased risk for insulin resistance and Type 2 diabetes, so they should be screened (recommendations are to use the oral glucose tolerance test because of its increased sensitivity).

Dx: Clinical (menstrual irregularities + signs of hyperandrogenism) + serum prolactin and TSH ± testosterone and DHEA levels (mild elevation of both; severe increases should cause you to suspect an adrenal or ovarian tumor).

Tx: Weight loss + endometrial protection, if doesn't desire pregnancy (OCPs) or ovulation induction with clomiphene, if does desire ± spironolactone, if need to treat excess androgens. Metformin is helpful in some.

SCRIPT

Tall, introspective male has:

- Long arms and legs
- Small testes
- Sparse hair growth and muscle development
- Gynecomastia
- $\pm$ Learning disabilities
- $\uparrow$ FSH and LH
- $\downarrow$ Testosterone

What is the diagnosis?

Diagnosis is **Klinefelter syndrome**.

Classic karyotype is 47,XXY. The case could present similar physical exam findings but include a complication of testosterone deficiency, such as osteoporosis. Be on the lookout for that. Remember that osteoporosis in a male always indicates an underlying cause, often testosterone deficiency.

Dx: Karyotype.

Tx: Supportive.



SCRIPT

Obese patient complains of:

- Weight gain
- Polyuria
- Polydipsia
- Fasting plasma glucose ≥ 126 (or a 2-hr plasma glucose ≥ 200 after 75-gram glucose load or an HbA1c $\geq 6.5\%$) on at least 2 separate occasions

What is the diagnosis?

Diagnosis is **diabetes mellitus**.

Dx: Clinical + FPG ≥ 126 or HbA1c $\geq 6.5\%$, confirmed on at least 2 separate occasions unless the hyperglycemia is unequivocal (e.g., DKA).

Tx: Control of blood glucoses via insulin or oral hypoglycemics + 10-year risk assessment for CHD to determine need for low-dose aspirin as primary prevention for CHD + risk assessment for use of ACEI, if not hypertensive or with microalbuminuria + control of lipids with target LDL 70–100 (remember, DM is a coronary risk equivalent).



SCRIPT

20-year-old female with primary amenorrhea has:

- Short stature
- Widely spaced nipples
- Minimal breast development
- A webbed neck
- Minimal axillary and pubic hair

What is the diagnosis?

Diagnosis is **Turner syndrome**.

Dx: Karyotype is 45,XO.

Tx: Supportive.



SCRIPT

52-year-old female develops:

- Amenorrhea
- Episodes of diaphoresis and heat intolerance
- ↑ FSH and LH

What is the diagnosis?

Diagnosis is **menopause**.

The FSH and LH are the clues to the diagnosis in this case. While pheo is associated with episodes of diaphoresis, pheo would not explain the amenorrhea and the gonadotropin levels. 52 years is the average age of onset of menopause.

Dx: Clinical + FSH and LH levels (increased).

Tx: Supportive.

SCRIPT

Young marathon runner with BMI < 18 develops:

- Amenorrhea
- Urine pregnancy test: Negative
- Mild ↓ FSH and LH
- Normal TSH
- Normal prolactin

What is the diagnosis?

Diagnosis is **functional hypothalamic amenorrhea**.

Functional hypothalamic amenorrhea probably will be presented in the context of a patient who exercises excessively. Think about it whenever you see a clinical scenario include any description of an intense exercise regimen. Other causes include eating disorders, stress and illness, nutritional disease (e.g., celiac disease), and $> 10\%$ loss of body weight.

Dx: Clinical + FSH and LH.

Tx: Supportive.

SCRIPT

Healthy patient, age 30–40 years, presents with episodic:

- Headaches
- Palpitations
- Sweating
- ↑ BP

What is the diagnosis?

Diagnosis is **pheochromocytoma**.

Always think about pheo when the clinical case includes episodes of hypertension and headache.

Dx: Screen with 24-hour urine for fractionated catecholamines and metanephrines. For patients with a high clinical probability (e.g., MEN syndrome or FH of pheo), consider plasma fractionated metanephrines. Add abdominal CT or MRI to localize, if screening tests are positive.

Tx: Surgical resection; don't forget to control blood pressure with phenoxybenzamine before the patient goes to the OR for resection.

SCRIPT

Patient with long-standing HTN and DM, uncontrolled blood glucoses, and microscopic proteinuria develops:

- Gradual $\uparrow$ Serum K
- Stage 2–3 chronic kidney disease while on stable doses of an ACEI
- Recent orthostatic hypotension
- $\downarrow$ Serum HCO_3
- Normal AG

What is the diagnosis?

Diagnosis is **secondary hypoaldosteronism** caused by **long-standing diabetes mellitus**.

All of the signs/symptoms included in this script have to be considered in the context of long-standing diabetes. Think about the complications of diabetic nephropathy, notably renal tubular acidosis (Type 4) and hypoaldosteronism. You might have thought this was a case of adrenal insufficiency because of the hypotension and hyperkalemia. But there is no specific association between diabetic nephropathy and adrenal insufficiency. Remember that your diagnosis needs to explain all of the elements in the case. In real life, you must exclude adrenal insufficiency by giving a cosyntropin stimulation test before you make the diagnosis of hypoaldosteronism.

Dx: Clinical + PAC (low) + PRA (low) + normal response to +cosyntropin.

Tx: Bicarbonate replacement + maximum support of CKD, DM, and HTN.



SCRIPT

35-year-old female with no PMH, on no medications, develops:

- ↑ BP
- ↓ Serum K
- ↓ Plasma renin activity
- ↑ Plasma aldosterone concentration

What is the diagnosis? What are other names for this condition?

Diagnosis is an **adrenal tumor** “**Conn syndrome**” or **bilateral adrenal hyperplasia**.

Other names are **primary hyperaldosteronism** and **hyporeninemic hyperaldosteronism**.

The hypokalemia should make you think about causes of secondary HTN, regardless of the patient's age. Next, interpret the renin and aldo results. Renin is low in states where aldo is in excess as the primary abnormality, such as with an adrenal tumor or hyperplasia.

Dx: Clinical + PAC:PRA (ratio of plasma aldosterone concentration to plasma renin activity; > 20 in an adrenal tumor) + measure aldosterone after oral or parenteral sodium load (if adrenal hyperplasia or tumor present, aldo will not suppress after sodium) + CT of the adrenals to assess for bilateral adrenal hyperplasia or an adrenal tumor.

Tx: Depends on cause; treat hyperplasia with diuretics and send tumors for surgical resection.

SCRIPT

60-year-old male with no PMH, on no medications, develops:

- ↑ BP
- ↓ Serum K

What is the most likely diagnosis?

Diagnosis is **secondary hyperaldosteronism** caused by **renal artery stenosis**.

Another name is **hyperreninemic hyperaldosteronism**.

The leading cause of secondary hypertension in all age groups is renal artery disease; it's fibromuscular dysplasia in young women, and atherosclerotic renal artery stenosis in men over the age of 50 years. Always, always, always think about causes of secondary hypertension when you see a case of hypertension with complicating hypokalemia. Perhaps you know the diagnostic test you're supposed to conduct (that "aldo renin ratio thingie"), but the diagnosis escaped you. Be careful to know both the terms for the diagnosis and the approach used to make the diagnosis.

Dx: Clinical + PAC:PRA (ratio of plasma aldosterone concentration to plasma renin activity; < 10 in renovascular disease) + noninvasive imaging of renal arteries (MRA, CTA, or Doppler U/S). The aldosterone and renin tests are performed to exclude an adrenal tumor and adrenal hyperplasia as the cause of the HTN and hypokalemia, because adrenal tumors and hyperplastic adrenals frequently secrete excess aldosterone, which decreases the serum K.

Tx: Revascularization.



SCRIPT

Healthy patient develops:

- Gradual onset of anxiety and tremulousness
- Palpable thyroid nodule
- Undetectable TSH
- Thyroid scan = single hot nodule

What is the diagnosis?

Diagnosis is **toxic adenoma**.

Remember that hot nodules are rarely associated with malignancy, and do not require biopsy.

Dx: Clinical exam + TSH + ultrasound + uptake scan.

Tx: Radioiodine ablation.

SCRIPT

Healthy patient develops:

- Gradual onset of anxiety, tremulousness, and increasing neck mass
- Multiple palpable thyroid nodules of varying sizes
- Undetectable TSH
- Thyroid scan = multiple hot nodules with prominent cold nodule

What is the diagnosis?

Diagnosis is **toxic multinodular goiter and a cold nodule**.

Cold nodules, even in the setting of a multinodular goiter, require biopsy.

Dx: Clinical exam + TSH + ultrasound + uptake scan $\pm$ fine needle aspiration of cold nodule.

Tx: Radioiodine ablation or surgery; this is a case of hyperthyroidism where surgery might be performed so that the cold nodule can be resected, in lieu of doing an FNA of the nodule first.

SCRIPT

Premenopausal female presents with:

- Gradual onset of truncal weight gain, acne, and amenorrhea
- ↑ BP, excess hair on the cheeks and chin, fat in a cervicodorsal distribution, moon facies, plethora, and bright purple abdominal striae
- ↑ Fasting blood glucose
- Normal anion gap
- ↓ Serum K and ↑ HCO_3^-
- DXA scan: Z-score < -2.0

What is the diagnosis?

Diagnosis is **Cushing syndrome**.

Bright purple abdominal striae always, always, always are associated with Cushing syndrome.

"Cervicodorsal fat pad" is the current term for "buffalo hump," so look for that terminology in an exam setting. Acne, hirsutism, moon facies, plethora, easy bruising, hypertension, insulin resistance, hypokalemic metabolic alkalosis are classic stigmata of Cushing syndrome. Remember, syndrome is the generic term; "syndrome" does not specify etiology. Cushing disease is caused by an ACTH-secreting pituitary adenoma.

Dx: Clinical + 24-hour urine free cortisol level (screening test that excludes Cushing syndrome when not elevated) or 1 mg (low dose) dexamethasone suppression test (failure to suppress 8 a.m. cortisol after 1 mg injection given previous evening indicates true Cushing syndrome). Do not ever measure a random serum cortisol as part of this workup.

Tx: Depends on etiology; if Cushing syndrome is diagnosed, proceed with tests to identify source.



SCRIPT

Chronic alcoholic patient with HTN and obesity presents with:

- Concentration of fat in the truncal region
- Development of small cervicodorsal fat pad
- Slightly ↑ urine free cortisol level
- 1 mg overnight dexamethasone suppression test: Suppression of a.m. cortisol production

What is the diagnosis?

Diagnosis is **pseudo-Cushing syndrome**.

The script gives you some features of Cushing syndrome but mentions that the patient is an alcoholic. Remember the associations of depression, obesity, and alcoholism with pseudo-Cushing syndrome.

The tests help you distinguish this entity from true Cushing's (pseudo-Cushing's suppresses with a small amount of dexamethasone). True Cushing's would not suppress with 1 mg dexamethasone.

Dx: Clinical + 24-hour urine free cortisol level (excludes true Cushing syndrome when not elevated but may be slightly high in pseudo-Cushing's); 1 mg dexamethasone suppression test (suppression of a.m. cortisol occurs in pseudo-Cushing's). Do not ever measure a random serum cortisol as part of this workup.

Tx: None required.

SCRIPT

Patient presents with gradual onset:

- Truncal weight gain
- Acne
- Hirsutism
- Amenorrhea
- Cervicodorsal fat pad, moon facies, plethora, bright purple abdominal striae, and $\uparrow$ BP
- $\uparrow$ Fasting blood glucose
- Normal anion gap
- $\downarrow$ Serum K and $\uparrow$ HCO_3
- DXA scan: Z-score < -2.0
- ACTH: Unmeasurable
- High-dose dexamethasone (8 mg) given overnight: No suppression of a.m. cortisol

What is the diagnosis?

Diagnosis is **an adrenal tumor (either an adenoma or a carcinoma)**.

Just as thyroid disease has classic presenting signs/symptoms, Cushing syndrome also has them, and you should recognize them in this script (bright purple abdominal striae, cervicodorsal fat pad, acne, hirsutism, moon facies, plethora, easy bruising, hypertension, insulin resistance, osteoporosis, and a hypokalemic metabolic alkalosis). You must be able to interpret the ACTH level and the dex suppression test to get this diagnosis: Adrenal tumors do not suppress with high-dose dexamethasone and are associated with low ACTH levels because of negative feedback. Remember that a pituitary adenoma would increase ACTH. Adrenal carcinomas usually have high levels of DHEA and urine 17-ketosteroids. Adrenal adenomas usually have modest increases in DHEA.

Dx: Clinical + 24-hour urine free cortisol (increased) + 8 mg dex suppression test (fails to suppress) + ACTH (undetectable) + CT scan of adrenals.

Tx: Surgical resection,

SCRIPT

Patient presents with gradual onset:

- Truncal weight gain
- Acne
- Hirsutism
- Amenorrhea
- Cervicodorsal fat pad, moon facies, plethora, bright purple abdominal striae, and $\uparrow$ BP
- $\uparrow$ Fasting blood glucose
- Normal anion gap,
- $\downarrow$ Serum K and $\uparrow$ HCO_3^-
- DXA scan: Z-score < -2.0
- $\uparrow$ 24-hour urine free cortisol
- Low-dose (1 mg) dexamethasone:
No suppression of a.m. cortisol
- $\uparrow$ ACTH
- High-dose dexamethasone (8 mg):
Suppression

What is the diagnosis?

Diagnosis is **ACTH-secreting pituitary adenoma**.

This Dx is also called Cushing disease. Just as thyroid disease has classic presenting signs/symptoms, Cushing syndrome also has them, and you should recognize them in this script (bright purple abdominal striae, cervicodorsal fat pad, acne, hirsutism, moon facies, plethora, easy bruising, hypertension, insulin resistance, osteoporosis, and a hypokalemic metabolic alkalosis). You must be able to interpret the ACTH level and the dex suppression test to get this diagnosis: Pituitary adenomas do not suppress with low-dose dex but do suppress with high dose. ACTH is increased. Rarely, a patient with these findings also could have an ectopic ACTH-secreting tumor. Usually these are primary lung cancers or a carcinoid tumor. The clinical presentation of an ectopic lung tumor usually is less cushingoid (presenting only with HTN and the metabolic abnormalities, i.e., hypokalemia) because growth of the tumor is quite rapid.

Dx: Clinical + 24-hour urine free cortisol (increased) + 8 mg dex suppression test (suppresses) + ACTH (high) + brain MRI.

Tx: Surgical resection.



SCRIPT

Patient presents with gradual onset:

- Fevers and weakness
- Nausea and vomiting
- Sporadic abdominal pain
- Tanned skin
- ↓ BP
- ↓ Serum Na, ↑ K and ↓ glucose ± eosinophilia
- 60 minutes after cosyntropin, serum cortisol: 7 µg/dL

What is the diagnosis?

Diagnosis is **primary adrenal insufficiency**.

This patient is tanned because ACTH is increased. The classic presentation for adrenal insufficiency is contained in this script (weakness, vomiting, abdominal pain, fever, hypotension, hypoglycemia, and eosinophilia.) If the AI is primary, it is associated with hyperkalemia and tanned skin because all layers of the adrenal cortex are diseased resulting in mineralocorticoid and glucocorticoid deficiencies. But secondary AI is not associated with hyperpigmentation (because ACTH is low) or hyperkalemia (because the glomerulosa layer of the adrenal cortex is not diseased and continues to be stimulated by the renin-angiotensin system). Keep straight the electrolyte differences in primary AI (hyperkalemia and metabolic acidosis because of deficiencies of both cortisol and aldosterone) and Cushing syndrome (hypokalemic metabolic alkalosis because of excess aldosterone effect).

Dx: Clinical + cosyntropin test.

Tx: Glucocorticoid and mineralocorticoid replacement.



SCRIPT

Patient presents with gradual onset:

- Fevers and weakness
- Nausea and vomiting
- Sporadic abdominal pain
- ↓ BP
- ↓ Serum glucose ± eosinophilia
- Normal HCO₃ and K
- 60 minutes after cosyntropin, serum cortisol is < 20 µg/dL

What is the diagnosis?

Diagnosis is **secondary adrenal insufficiency**.

Elements of the classic presentation of adrenal insufficiency are contained in this script, so you should recognize the presentation of AI. But, the patient is not tanned or hypokalemic. The cosyntropin result is abnormal, so AI is present. The absence of skin hyperpigmentation and a potassium derangement tells you the AI is secondary. AI is not associated with hyperpigmentation (because ACTH is low) or hyperkalemia (because the glomerulosa layer of the adrenal cortex is not diseased and continues to be stimulated by the renin-angiotensin system).

Dx: Clinical + cosyntropin test + ACTH level (low).

Tx: Glucocorticoid replacement ± mineralocorticoid replacement.

SCRIPT

Type 1 diabetic develops gradual onset:

- Fever, weakness, nausea, vomiting, sporadic abdominal pain, and tanned skin
- Alopecia
- Episodes of hypoglycemia on a previously stable insulin regimen
- ↓ BP
- Delayed reflexes
- ↓ Serum Na, ↑ K, and ↑ TSH

What are the two diagnoses?

Diagnoses are **hypothyroidism and adrenal insufficiency**.

These diagnoses can occur together as part of the polyglandular autoimmune syndrome II, also called Schmidt syndrome. Know that you must replace the cortisol before you replace the thyroid hormone. Hopefully, you recognize the collection of classic signs and symptoms for both adrenal insufficiency and hypothyroidism. Then think about the relationships that you know exist between the two. Recognize that this patient is not presenting with pituitary disease because the TSH is high, not low; and, the patient is tanned, so the ACTH is high, not low. Therefore, both the thyroid and adrenal diseases are primary. Three failing glands (pancreas, thyroid, and adrenal) should make you consider a polyglandular syndrome.

Dx: Clinical + TSH + electrolytes + cosyntropin test (cortisol would not increase after ACTH).

Tx: Replacement of levothyroxine, glucocorticoids, and mineralocorticoids.



SCRIPT

25-year-old female with no family history of HTN develops:

- ↑ BP
- ↓ Serum K

What is the most likely diagnosis?

Diagnosis is **secondary hyperaldosteronism** caused by **fibromuscular dysplasia**.

Another name is **hyperreninemic hyperaldosteronism**.

The leading cause of secondary hypertension in all age groups is renal artery disease; it's fibromuscular dysplasia in young women, and atherosclerotic renal artery stenosis in men over the age of 50 years. Always, always, always think about causes of secondary hypertension when you see a case of hypertension with complicating hypokalemia. Perhaps you know the diagnostic test you're supposed to conduct (that "aldo renin ratio thingie"), but the diagnosis escaped you. Be careful to know both the terms for the diagnosis and the approach used to make the diagnosis.

Dx: Clinical + PAC:PRA (ratio of plasma aldosterone concentration to plasma renin activity; < 10 in renovascular disease) + noninvasive imaging of renal arteries (MRA, CTA, or Doppler U/S). The aldosterone and renin tests are performed to exclude an adrenal tumor and adrenal hyperplasia as the cause of the HTN and hypokalemia, because adrenal tumors and hyperplastic adrenals secrete excess aldosterone, which decreases the serum K.

Tx: Revascularization.

SCRIPT

Postpartum patient develops:

- Anxiety and tremulousness
- Nontender goiter
- +Anti-TPO antibodies

What is the diagnosis?

Diagnosis is **postpartum thyroiditis**.

The key in this script is that the patient is in the postpartum period. Be aware that thyroid disease often presents during this time. The patient can present with hypothyroidism, hyperthyroidism, or no abnormality but a goiter. A long-term complication includes chronic hypothyroidism, especially in patients with anti-TPO antibodies.

Dx: Clinical + TSH (result depends on presentation) + FT4 (result depends on presentation) + uptake scan (decreased).

Tx: Symptomatic treatment; disease self-resolves but watch for eventual development of chronic hypothyroidism, especially in those with anti-thyroid antibodies.



SCRIPT

Healthy patient presents with:

- Midline palpable thyroid nodule
- Normal TSH
- Ultrasound: Solid mass without suspicious characteristics
- Thyroid scan = single cold nodule (generally not necessary)

What is the diagnosis?

Diagnosis is **single cold thyroid nodule**.

Cold nodules carry a risk of malignancy and should always be biopsied.

Dx: Clinical exam + TSH + ultrasound + uptake scan + fine needle aspiration of nodule.

Tx: Depends on result of biopsy.

SCRIPT

Healthy patient presents with:

- Recent onset of anxiety and tremulousness that improves within days to weeks
- ↓ TSH and ↑ FT4
- ↓ RAIU

What is the diagnosis?

Diagnosis is **painless ("silent") thyroiditis**.

This patient presents with self-resolving thyrotoxic symptoms but with a decreased uptake consistent with a form of thyroiditis. This same entity is called "postpartum thyroiditis" when it occurs in the first couple of months after delivery. ~ Half of patients with painless thyroiditis develop chronic autoimmune thyroiditis and hypothyroidism. You might have guessed "Hashitoxicosis" (the rare thyrotoxic presentation of chronic autoimmune thyroiditis. It is associated with a transient increase in the RAIU (presents exactly like Graves disease). Hyperthyroidism due to silent thyroiditis can be differentiated from Graves and Hashitoxicosis based on the RAIU result (decreased in silent and increased in the other two).

Dx: Clinical + TSH (decreased initially, then can become normal or increased) + FT4 (usually increased initially, then can become normal or decreased) + uptake scan (decreased).

Tx: Symptomatic treatment of hyperthyroidism if the patient is uncomfortable (beta-blockers); disease self-resolves but watch for eventual development of chronic hypothyroidism in half.



SCRIPT

Patient with chronic h/o undiagnosed anxiety, tremulousness, tachycardia, and diarrhea develops:

- Acute illness, such as pneumonia, then becomes confused, febrile, hypertensive, and delirious
- ↓ Platelets, ↑ serum Ca, ↑ alkaline phosphatase

What is the diagnosis?

Diagnosis is **thyroid storm caused by untreated Graves disease**.

This script gives you antecedent symptoms of classic hyperthyroidism (anxiety, tremulousness, diarrhea, and tachycardia) prior to the acute presentation that includes confusion, fever, and hypertension. You know this is something more serious than simple hyperthyroidism because of these acute symptoms. Sometimes it's difficult to distinguish this kind of case from acute adrenal insufficiency and infection, but remember that you must explain all of the abnormal features of the clinical case with your diagnosis; e.g., tough to explain the thrombocytopenia and increased alka phos with AI. The thyroid studies weren't included in the script because you need to recognize the storm from its clinical presentation, and know that you need to order the thyroid tests to make the diagnosis.

Dx: Clinical + TSH (unmeasurable) + FT3 and FT4 (usually increased).

Tx: Methimazole + beta-blockers + glucocorticoids + iodine.



SCRIPT

Healthy patient presents with:

- Fatigue
- Painful swallowing
- Neck pain
- Very tender goiter
- ↓ RAIU

What is the diagnosis? And what is the usual cause?

Diagnosis is **subacute thyroiditis** caused by a **virus**.

The major clue here is the very tender neck. Remember that RAIU is decreased in all forms of thyroiditis. The TSH is not included in the script because it could be high, low, or normal.

Dx: Clinical + TSH + uptake and scan (decreased).

Tx: NSAIDs + beta-blockers (if presents uncomfortable and in hyperthyroid state) + observation.

SCRIPT

Patient presents with gradual onset:

- Tremulousness
- Anxiety
- Weight loss
- Diffuse muscle weakness
- Diarrhea
- Amenorrhea or erectile dysfunction
- ↑ BP and HR ± atrial fibrillation and exophthalmos
- ↓ Hgb and Hct with normal MCV and MCHC
- ↑ Serum Ca and alkaline phosphatase
- Uptake and scan: Diffusely increased

What is the diagnosis?

Diagnosis is **Graves disease**.

Recognize the classic stigmata of hyperthyroidism (tremulousness, anxiety, weight loss, diffuse muscle weakness, diarrhea, lid-lag $\pm$ exophthalmos, amenorrhea or erectile dysfunction, hypertension, tachycardia, atrial fibrillation, normochromic/normocytic anemia, hypercalcemia, and increased alkaline phosphatase). The uptake scan tells you the diagnosis. Rarely, Hashitoxicosis (a hyperthyroid phase of chronic autoimmune thyroiditis) can present this way, even with same uptake scan findings. But, know that in regard to etiologies of hyperthyroidism, exophthalmos occurs only in Graves.

Dx: Clinical + TSH (unmeasurable) + FT3 (may be increased) + FT4 (usually increased) + thyroid uptake and scan (diffuse and increased uptake).

Tx: Methimazole + beta-blockers + radioactive iodine ablation + eventual replacement of levothyroxine.



SCRIPT

Premenopausal female presents with:

- Chronic malaise
- Constipation
- Alopecia
- Cold intolerance
- Galactorrhea
- MRI: ↑ Pituitary size
- ↑ Prolactin level

What is the diagnosis?

Diagnosis is **hyperprolactinemia caused by primary hypothyroidism**.

The most likely cause is severe primary hypothyroidism with thyrotroph hyperplasia simulating a pituitary adenoma (causing the mass seen on MRI). This could be a prolactinoma, but is less likely because prolactinomas are not associated with the features of hypothyroidism (malaise, constipation, alopecia, and cold intolerance). Remember the causes of hyperprolactinemia (primary hypothyroidism, drugs, chest stimulation) and that high serum prolactin levels are not always caused by a pituitary tumor. Never diagnose prolactinoma before excluding primary hypothyroidism first!

Dx: TSH + FT4.

Tx: Replacement levothyroxine.



SCRIPT

Postmenopausal female presents with:

- Gradual onset of headaches and mental foggiess, constipation, and alopecia
- Episodes of diaphoresis, pallor, and tremors that improve with eating
- ↓ Serum Na and normal K
- ↓ Hgb; normal MCV and MCHC
- ↑ Total cholesterol
- ↓ FSH and LH

What is the diagnosis?

Diagnosis is **hypopituitarism**.

Hormone abnormalities include secondary hypothyroidism, secondary adrenal insufficiency, and hypogonadotropic hypogonadism. This case includes a few of the classic stigmata of hypothyroidism (weight gain, cold intolerance, constipation, subjective swelling of hands and feet, alopecia, coarse hair, periorbital edema, slight nonpitting edema, delayed reflexes, hyponatremia, normochromic/normocytic anemia, and hypercholesterolemia). But additional endocrine abnormalities are present: Hypogonadotropic hypogonadism and hypoglycemia due to secondary adrenal insufficiency (AI). Notice the script does not include hyperkalemia as a feature because secondary AI has a normal serum K (only primary AI has hyperkalemia).

Dx: Brain MRI + serum levels of pituitary hormones (prolactin, IGF-1, ACTH, urine free cortisol, TSH, FT4) + FSH and LH and measurement of their subunit concentrations (helps to exclude a gonadotroph tumor).

Tx: Depends on etiology (tumor vs. infiltration vs. systemic disease) + replacement of deficiencies.



SCRIPT

Patient with h/o:

- Primary hypothyroidism, adherent to thyroid replacement
- Takes multiple vitamins
- Chronic ↑ TSH at follow-up

What is the cause of the persistent TSH elevation?

The cause is **chelation of thyroid hormone by vitamin supplements.**

Dx: Clinical.

Tx: Separate vitamin supplements from thyroid replacement by several hours.

SCRIPT

Male with obstructive sleep apnea and extreme foul body odor presents with:

- Increasing ring and shoe sizes, frontal bossing, and deepening of his voice
- Paresthesias in ring and pinky fingers
- Tan-colored, fleshy rash in his armpits
- Multiple dental caries and jaw malocclusion
- ↑ Fasting plasma glucose
- New onset hypertension
- Multiple adenomatous colon polyps

What is the diagnosis?

Diagnosis is **acromegaly**.

Screen for this by measuring an IGF-1 level. This case should be easy because it discusses increasing ring and shoe sizes; only one disease process does that. On the exam, however, this part of the history may be omitted. Know the associations with underlying acromegaly; OSA, hypertension, insulin resistance, multiple colon polyps, and acanthosis nigricans. These patients have an increased mortality if the underlying tumor is not found and treated.

Dx: Screening IGF-1 + confirmatory measurement of serum growth hormone after oral glucose tolerance test (should be suppressed; if increased after glucose test load, then patient has acromegaly) + brain MRI.

Tx: Surgical resection; usually these patients have large tumors.



SCRIPT

Patient with diabetes $\pm$ warfarin use develops:

- Acute onset of headache
- Bitemporal hemianopsia
- $\pm$ Neck stiffness
- $\pm$ Confusion or loss of consciousness
- MRI: High density mass in the sella

What is the diagnosis?

Diagnosis is **pituitary apoplexy**.

The clue that the problem is in the pituitary is the presence of the bitemporal hemianopsia, which suggests a problem around the area of the optic chiasm. These "bitemporal" buzzwords should always make you think pituitary disease. Patients with apoplexy may or may not have preexisting symptoms of a pituitary mass. It depends on the cause of apoplexy. Compromise of vascular supply due to growth of adenoma usually is associated with antecedent adenoma symptoms, but hemorrhage into gland usually is not.

Dx: Brain MRI.

Tx: Neurosurgery.

SCRIPT

Patient on lithium for bipolar disorder develops:

- Polyuria, polydipsia, and nocturia
- Normal serum Na and low urine specific gravity
- Water restriction: ↑ Serum Na, large urine volume, low urine specific gravity
- ADH administration: No change (persistent ↑ serum Na, large urine volume, low urine specific gravity)

What is the diagnosis?

Diagnosis is **nephrogenic diabetes insipidus**.

Distinguish the polyuria and polydipsia that occurs with manic psychogenic polydipsia from diabetes insipidus by looking in the script for evidence of increased thirst and nocturia. Patients with psychogenic polydipsia do not continue to drink while asleep, so they do not have nocturia; but, nocturia is an early symptom in diabetes insipidus. Next, look at the serum sodium level. Patients with psychogenic polydipsia have a low serum sodium (because the water dilutes the serum). But, patients with DI have a normal to high serum sodium, depending on their access to water (because they pee out the water and concentrate their serum). With water restriction, the patient with DI develops hypernatremia and a persistently low urine specific gravity (they continue to pee out the water even though their serum is becoming concentrated). Remember that lithium is a cause of nephrogenic DI.

Dx: Clinical + serum Na + urine volume + urine Na + urine osmolality ± water restriction testing with ADH administration.

Tx: Discontinue lithium, if possible. Use thiazide diuretic if necessary.



SCRIPT

Patient presents with gradual onset:

- Weight gain
- Cold intolerance
- Constipation
- Alopecia
- Galactorrhea
- Amenorrhea
- Coarse hair
- Periorbital edema
- Nonpitting ankle edema
- ↓ HR and delayed reflexes
- ↓ Hgb and Hct with normal MCV and MCHC
- ↓ Serum Na
- ↑ Total cholesterol and serum prolactin
- ↑ TSH and ↓ FT4

What is the diagnosis?

Diagnosis is **primary hypothyroidism**.

Know the stigmata of classic hypothyroidism (weight gain, cold intolerance, constipation, subjective swelling of hands and feet, alopecia, coarse hair, periorbital edema, slight nonpitting edema, delayed reflexes, hyponatremia, normochromic/normocytic anemia, and hypercholesterolemia). Clinical cases may include only a few of these manifestations. Recognize that this script includes some manifestations of hypothyroidism, and then, note that symptoms of other potential endocrine abnormalities also are present (galactorrhea and amenorrhea—which should make you consider hyperprolactinemia). Then, consider the relationship between thyroid disease and the prolactin levels. Remember that hypothyroidism causes hyperprolactinemia. Don't diagnose a prolactinoma until you've looked at the thyroid first. The labs tell you that the thyroid problem is definitely not originating in the pituitary because the TSH is high, not low.

Dx: Clinical + TSH + FT4.

Tx: Replacement of levothyroxine.



SCRIPT

Patient is:

- Hospitalized for an acute, non-thyroidal illness such as gallstones
- ↓ TSH, ↓ FT4, ↓ FT3

What is the diagnosis?

Diagnosis is **euthyroid sick syndrome**.

Notice how the labs suggest secondary or tertiary hypothyroidism, which are both rarer than euthyroid sick syndrome. So, always consider euthyroid sick before making a diagnosis of secondary or tertiary hypothyroidism. Never order thyroid tests in a sick patient, unless you believe that the cause of the acute illness is thyroid storm or myxedema coma. rT3 (reverse T3) can be measured to definitively diagnose euthyroid sick syndrome, but this test is not usually performed.

Dx: Clinical.

Tx: Repeat the thyroid tests after the acute illness resolves.

SCRIPT

Healthy female presents with gradual onset:

- Fatigue
- Weight gain
- Alopecia
- Constipation
- $\pm$ Amenorrhea
- Delayed reflexes
- $\downarrow$ Hgb and Hct with normal MCV and MCHC
- $\downarrow$ Serum Na and $\uparrow$ total cholesterol

What is the diagnosis?

Diagnosis is **primary hypothyroidism**.

This case includes many of the classic signs and symptoms of hypothyroidism.

Dx: TSH + FT4.

Tx: Replacement of levothyroxine.



SCRIPT

Middle-aged patient with h/o alopecia and fatigue develops:

- Confusion
- Hypothermia, ↓ BP, ↓ HR
- Delayed reflexes
- Nonpitting ankle edema
- ↓ Hgb and Hct with normal MCV and MCHC

What is the diagnosis?

Diagnosis is **myxedema coma**.

This script gives you antecedent symptoms of classic hypothyroidism (alopecia and fatigue) prior to the acute presentation that includes hypotension, confusion, and bradycardia. You know this is something more serious than simple hypothyroidism because of these acute symptoms. If hypoglycemia was included in the script, what additional diagnosis would you be concerned about? Adrenal insufficiency.

Dx: Clinical history and acute presentation + TSH (high) + FT4 (low) ± cosyntropin test (if suspect comorbid AI).

Tx: Parenteral T3 and T4 replacement + careful administration of IVF and replacement of electrolytes + passive warming + broad-spectrum empiric antibiotics ± parenteral glucocorticoids, if suspect comorbid AI (but be sure to give them before the replacement of thyroid hormone, or will cause acute decompensation because of increased metabolic demands).



SCRIPT

Patient presents with gradual onset:

- Tremulousness
- Anxiety
- Weight loss
- Diffuse muscle weakness
- Diarrhea
- Amenorrhea or erectile dysfunction
- ↑ BP and HR ± atrial fibrillation and lid-lag
- ↓ Hgb and Hct with normal MCV and MCHC
- ↑ Serum Ca and alkaline phosphatase

What is the diagnosis?

Diagnosis is **hyperthyroidism**.

Screening tests would show: Undetectable TSH and $\uparrow$ FT4. Just as hypothyroidism has classic signs and symptoms, hyperthyroidism also has classic stigmata (tremulousness, anxiety, weight loss, diffuse muscle weakness, diarrhea, lid-lag $\pm$ exophthalmos, amenorrhea or erectile dysfunction, hypertension, tachycardia, atrial fibrillation, normochromic/normocytic anemia, hypercalcemia, and increased alkaline phosphatase). This collection of signs/symptoms gives you the diagnosis. You do not know the cause of the hyperthyroid state, only that it is present.

Dx: Clinical + TSH (low) + FT3 and FT4 (both may be increased); to identify the cause, you would next do an uptake and scan.

Tx: Depends on the etiology.

SCRIPT

Female on no medications with no PMH presents with:

- Chronic headaches
- Secondary amenorrhea
- Galactorrhea
- $\pm$ Bitemporal hemianopsia
- $\downarrow$ FSH and LH

What is the diagnosis?

Diagnosis is **prolactinoma**.

The clues here are headaches and amenorrhea. The increased prolactin leads to a decrease in FSH and LH and subsequent amenorrhea. Sometimes it's hard to tell which of the endocrine abnormalities came first, but always think about a prolactinoma or hypothyroidism when you see galactorrhea as part of the clinical presentation. Remember that you must exclude primary hypothyroidism in the workup.

Dx: Serum prolactin level + MRI head.

Tx: Cabergoline or estrogen-containing birth control pills okay if 1) patient not seeking fertility, 2) tumor is a microadenoma, and 3) galactorrhea is not bothersome.

SCRIPT

Postmenopausal female on no meds presents with:

- Headaches and loss of peripheral vision
- Weight gain, constipation, alopecia
- Delayed reflexes
- ↓ Serum Na
- ↓ FSH and LH

What is the diagnosis?

Diagnosis is **pituitary tumor causing mass effect, hypogonadism, and secondary hypothyroidism**. Clues to a diagnosis of thyroid disease are the signs and symptoms: Weight gain, constipation, alopecia, delayed reflexes, hyponatremia, and the decreased gonadotropins. FSH and LH in a postmenopausal female should be increased, not decreased. The presence of multiple endocrine derangements (thyroid disease + low gonadotropins) and headaches with vision loss suggest that the diagnosis is in the pituitary.

Dx: Brain MRI + serum levels of pituitary hormones (prolactin, IGF-1, urine free cortisol, TSH, FT4) + FSH and LH and measurement of their subunit concentrations (helps to exclude a gonadotroph tumor).

Tx: Nonfunctional tumors that do not produce hormones but cause neurologic impairments are referred for transsphenoidal resection + replacement of deficiencies.



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SCRIPT

Middle-aged male, with h/o heavy tobacco and alcohol use, presents with rapidly progressive:

- Weight loss
- Difficulty swallowing solids and, now, liquids
- Retrosternal chest pain
- ↓ Hgb and Hct

What is the diagnosis? What is it due to?

Diagnosis is **dysphagia due to malignancy**.

Remind yourself: Progressive dysphagia to solids and liquids = achalasia or scleroderma. Progressive dysphagia to solids first, then liquids = cancer or stricture. Intermittent dysphagia to solids = webs or rings. Remember there are two kinds of esophageal cancer. Patients who smoke and drink heavily are at risk for squamous cell cancer, as in this script. The script for adenocarcinoma would include a middle-aged male with a long history of GERD ± Barrett's.

Dx: Clinical + barium swallow + endoscopy with biopsy + TNM staging.

Tx: Chemotherapy + radiation therapy + surgical resection.

Misc: Sites for metastasis include liver (adenoCa), lungs (SCC), bones, and adrenals. Prognosis depends on histology, depth and size of the tumor, and existence of metastases.



SCRIPT

Male patient, aged 20–35 years, with h/o inhalant allergies, wheezing, and chronic rhinitis, presents with:

- Several years of dysphagia and h/o food impaction
- Retrosternal burning and occasional regurgitation of acid contents
- ± Normal WBC (Differential: ↑ Eosinophils)
- ± ↑ IgE
- EGD: Multiple mucosal rings

What is the diagnosis?

Diagnosis is **eosinophilic esophagitis**.

Dysphagia in a young male with a history of atopy is the script here. Trachealization of the esophagus with linear furrowing. Peripheral eosinophilia is seen in ~ 30% of patients, so don't be dissuaded from the diagnosis if eosinophils aren't part of the clinical scenario.

Dx: Clinical + endoscopy + biopsies (eosinophilic infiltration).

Tx: Elimination diet based on patient's own allergens and developed in concert with an allergist + topical glucocorticoids (e.g., swallowed fluticasone) ± PPI + esophageal dilation of rings.

SCRIPT

Healthy patient presents with:

- Intermittent retrosternal burning
- Regurgitation of acidic material
- Sensation of chronic lump in the throat
- Repeated throat-clearing

What is the diagnosis?

Diagnosis is **gastroesophageal reflux disease**.

Not all patients have burning and regurgitation symptoms. Some may have only the globus sensation and cough with bronchospasm and hoarseness.

Dx: Clinical $\pm$ endoscopy with biopsies if symptoms fail to respond to bid PPIs and when symptoms are worrisome such as odynophagia, GI bleeding, weight loss, and/or anemia $\pm$ RUQ U/S to exclude biliary tract disease if nausea and epigastric pain are present.

Tx: Lifestyle changes $\pm$ antacids $\pm$ H₂ antagonists $\pm$ PPI.



SCRIPT

Caucasian patient, older than 50 years, presents with:

- Long h/o retrosternal burning
- Sensation of a chronic lump in the throat
- Repeated throat-clearing
- EGD: Velvety-red columnar epithelium in the distal esophagus
- Biopsy of columnar epithelium: Intestinal metaplasia

What is the diagnosis?

Diagnosis is **Barrett esophagus**.

The presence of columnar epithelium in an area where it shouldn't be, and specialized intestinal metaplasia replacing normal esophageal squamous mucosa, is the definition of Barrett's.

Dx: Clinical + endoscopy with biopsies.

Tx: American Gastroenterology Association 2011 guideline recommendations include surveillance endoscopy with biopsies with interval determined by histology $\pm$ endoscopic eradication of existing dysplastic areas $\pm$ PPI (controversial in patients without h/o GERD symptoms).

Misc: The AGA recommends against screening all people with GERD for Barrett's; only certain individuals should be screened (> 50 y/o, male, Caucasian, chronic h/o GERD, hiatal hernia, increased BMI, or truncal obesity).



SCRIPT

Otherwise healthy patient, older than 45 years, presents with several weeks of:

- Epigastric “hunger”-type pain that wakes from sleep and occurs ~ 3 hours after meals but is relieved with antacids or eating
- Epigastric tenderness
- No weight loss or vomiting
- Barium swallow: Well-demarcated crater in the duodenal bulb

What is the diagnosis? What is the likely cause?

Diagnosis is **duodenal ulcer** caused by **H. pylori**.

H. pylori is the traditional cause of ulcerations in the duodenum. NSAIDs are also very important. The tricky part of evaluating dyspepsia is that clinical symptoms **cannot** reliably distinguish who has an ulcer and who doesn't. Usually, a workup for this sort of dyspepsia is only done in a patient older than 45 years of age or who has worrisome signs such as anemia or weight loss.

Dx: Clinical $\pm$ *H. pylori* testing (breath or stool antigen; 2 negative tests exclude) if young and without worrisome signs/symptoms or endoscopy with biopsies and urease testing if older, with risk factors for malignancy, or with worrisome signs/symptoms. If using PPI for any treatment, wean dose down to prevent hypersecretion after discontinuation.

Tx: If *H. pylori* present, treat with PPI and antibiotics; if non-*H. pylori* ulcer, antisecretory drug based on cost x 4–6 weeks $\pm$ maintenance antisecretory drug for patients with refractory disease.

Misc: Worrisome signs/symptoms include weight loss, anemia, dysphagia, early satiety, and GI blood loss.

SCRIPT

Patient presents with several-year h/o progressive:

- Difficulty swallowing solids
- Difficulty swallowing liquids
- Difficulty initiating a burp
- Weight loss of 5–10 lbs
- Intermittent chest pain
- Barium swallow: Beak-like narrowing

What is the diagnosis?

Diagnosis is **achalasia**.

If you don't recognize any of the other features here, dysphagia with liquids is the biggest clue. Always think about achalasia when you see that. It happens with systemic sclerosis also, but this script does not present other features of scleroderma. Progressive dysphagia to solids and liquids = achalasia or scleroderma. Progressive dysphagia to solids first, then liquids = cancer or stricture. Intermittent dysphagia to solids = webs or rings.

Dx: Clinical (symptoms often present for long period) + 3 diagnostic requirements (radiology [barium swallow], manometry [lack of peristalsis with or without $\uparrow$ LES pressure and incomplete LES relaxation], endoscopy [dilated esophagus with residual food particles & lack of malignancy]).

Tx: Nitrates + CCBs + dilation of LES, or botulinum toxin injection into the LES; surgical myotomy most definitive Rx.



SCRIPT

Middle-aged male patient with long h/o intermittent retrosternal burning and occasional regurgitation of acidic material develops gradual but progressive:

- Difficulty swallowing solids, then liquids

What is the diagnosis?

Diagnosis is **peptic (benign esophageal) stricture**.

The history of GERD preceding the dysphagia is your clue to the diagnosis. Remind yourself: Progressive dysphagia to solids and liquids = achalasia or scleroderma. Progressive dysphagia to solids first, then liquids = cancer or stricture. Intermittent dysphagia to solids = webs or rings.

Dx: Clinical + endoscopy ± barium swallow (if need to exclude achalasia).

Tx: Esophageal dilation during endoscopy.

SCRIPT

Young patient presents with:

- Recurrent episodes of acute chest pain after ingesting cold liquids
- Recurrent episodes of difficulty swallowing
- Negative cardiac stress test
- Barium swallow: Corkscrew pattern

What is the diagnosis?

Diagnosis is **diffuse esophageal spasm**.

The buzzwords in this script are "young," "cold liquids," and "corkscrew."

Dx: Clinical + manometry (excess simultaneous contractions) ± barium swallow ("corkscrew" esophagus).

Tx: Numerous pharmacologic options include diltiazem, trazodone, imipramine, sildenafil, botulinum toxin, and others. Nonpharmacologic approaches include ingestion of hot liquids and peppermint oil.

SCRIPT

Patient presents with:

- Years of intermittent difficulty swallowing solids (especially chicken or bread), often relieved with regurgitation or changing position
- No weight loss
- No anemia

What is the diagnosis? What is it due to?

Diagnosis is **dysphagia due to Schatzki ring**.

The intermittent nature of the presentation is an important clinical clue. Rings and webs are more often intermittent and nonprogressive, while cancers, strictures, and achalasia cause progressive dysphagia. Remind yourself: Progressive dysphagia to solids and liquids = achalasia or scleroderma. Progressive dysphagia to solids first, then liquids = cancer or stricture. Intermittent dysphagia to solids = webs or rings.

Dx: Clinical + endoscopy ± barium swallow (to exclude achalasia).

Tx: Esophageal dilation during endoscopy.



SCRIPT

Teen patient on oral doxycycline for chronic treatment of acne presents with acute onset:

- Pain with swallowing
- Retrosternal pain

What is the diagnosis?

Diagnosis is **pill-induced esophagitis**.

Doxycycline is famous for causing esophagitis especially when the patient takes the pill at night without water. Other notable drugs that can cause esophagitis include aspirin, potassium supplements, over-the-counter quinidine (often taken for leg cramps), iron supplements, and alendronate. Risk is increased if the drug is taken at bedtime and without water.

Dx: Clinical $\pm$ endoscopy, if need to exclude other causes of dysphagia because of patient's risk profile.

Tx: Discontinuation of the pill or substitute with a liquid preparation.



SCRIPT

Elderly patient, with h/o stable ischemic heart disease on daily aspirin, is prescribed a “Medrol dose pack” for acute poison ivy and naproxen sodium for osteoarthritis pain. Recent normal colonoscopy.

She develops:

- Dark, tarry stools
- Occasional lightheadedness
- Epigastric tenderness

What is the diagnosis?

Diagnosis is **bleeding ulceration in the stomach or duodenum**.

Be aware of the risk of NSAID-induced morbidity, especially in patients given concomitant corticosteroids. Very frequently, elderly patients do not have symptoms of dyspepsia with NSAID-induced peptic ulcer disease. *H. pylori* is the traditional cause of ulcerations in the duodenum. NSAIDs also are very important.

Dx: Clinical $\pm$ *H. pylori* testing (breath or stool antigen; 2 negative tests exclude) if young and without worrisome signs/symptoms, or endoscopy with biopsies and urease testing if older and with risk factors for malignancy or with worrisome signs/symptoms. If using PPI for any treatment, wean dose down to prevent hypersecretion after discontinuation.

Tx: If *H. pylori* present, treat with PPI and antibiotics; if non-*H. pylori* ulcer, antisecretory drug based on cost x 8–12 weeks $\pm$ maintenance antisecretory drug for patients with refractory disease.

Misc: Worrisome signs/symptoms include weight loss, anemia, dysphagia, early satiety, and GI blood loss.

SCRIPT

Male patient, age 30–50 years, presents with:

- Recurrent duodenal ulcers
- Diarrhea
- Retrosternal burning
- Weight loss
- Serum gastrin > 1,000 pg/mL

What is the diagnosis?

Diagnosis is **Zollinger-Ellison syndrome**.

Without the serum gastrin level included in the script, the diagnosis is harder to make. Think about Z-E syndrome in any patient with diarrhea and peptic ulcers, or recurrent ulcers.

Dx: Clinical + fasting serum gastrin concentration ($> 1,000$ pg/mL is diagnostic; must exclude achlorhydria from gastritis or pernicious anemia first, though) $\pm$ serum gastrin concentration after secretin stimulation if the fasting serum gastrin level is nondiagnostic and clinical suspicion is high.

Tx: PPI at high doses $\pm$ surgical resection for sporadic tumors without metastases.



SCRIPT

Patient with h/o a gastric ulcer presents with:

- Weight loss
- Anorexia
- Vague, epigastric pain
- Early satiety
- Brown, velvety rash in the neck and axillary folds
- ↓ Hgb, Hct, MCV, and MCHC

What is the diagnosis?

Diagnosis is **gastric carcinoma**.

Remember that gastric ulcers, especially nonhealing ones, can be malignant. A “brown, velvety rash” in the axillae and neck is acanthosis nigricans. It is considered a paraneoplastic presentation and it can present rapidly with the onset of gastric cancers. Prognosis is based on size and depth of tumor and spread. Localized tumors that have not invaded any blood vessels are curable with resection.

Dx: Clinical + endoscopy with biopsies + TNM staging.

Tx: Resection, resection + chemotherapy and radiation, or palliation (for stage IV).

SCRIPT

Previously healthy patient with FH of “colitis” presents with gradual:

- Weight loss, fatigue, fevers
- Crampy abdominal pain
- Bloody mucoid diarrhea
- Tenesmus
- ↓ Hgb, Hct, MCV, MCHC, serum Fe, serum Fe/TIBC
- Negative *C. difficile* toxin assay
- Negative stool O&P and culture
- Negative *Saccharomyces cerevisiae* antibody
- + pANCA
- EGD: No disease
- Colonoscopy: Inflammation and ulcerations that extend proximally from the rectum to beyond the sigmoid without skip areas
- Bowel pathology: Distorted crypt architecture with crypt abscesses

What is the diagnosis?

Diagnosis is **ulcerative colitis**.

1st degree relatives of patients with UC have an increased risk of UC. A case could include any of the other systemic manifestations of UC such as spondyloarthropathy, uveitis, erythema nodosum, pyoderma gangrenosum, and biliary tract involvement (e.g., primary sclerosing cholangitis that presents with an increased alk phos and GGT). Patients with less extensive disease can present with less acuity, have no or minimal fever and abdominal pain, and colonoscopy findings limited to the rectum or rectosigmoid areas. Remember that the antibody tests are not 100% specific, but generally, patients with UC lack anti-*Saccharomyces cerevisiae* and are positive for pANCA.

Dx: Clinical (including disease in 1st degree relatives) + colonoscopy with biopsies.

Tx: Depends on the extent of disease; 5-ASA drugs as a suppository ± glucocorticoid topical foam for proctitis; 5-ASA drug, or prednisone enemas for proctocolitis and left-sided colitis ± oral immunomodulators and 5-ASA if refractory; oral and topical 5-ASA drugs and glucocorticoids + immunomodulators for severe disease and pancolitis.

SCRIPT

Patient < 45 years old is diagnosed with colon cancer. He has the following in numerous 1st and/or 2nd degree relatives:

- Uterine cancer at age < 50 years
- Ovarian cancer
- Gastric cancer
- Pancreatic cancer
- Biliary cancer
- + Mismatch repair (*MMR*) gene mutation

What is the diagnosis?

Diagnosis is **Lynch syndrome (hereditary nonpolyposis colon cancer)**.

Additionally, think about Lynch syndrome in any patient who has two of the cancers listed in the script (e.g., colon and uterine cancer in a female before age 50 years). Disease is caused by a mutation in DNA mismatch repair gene.

Dx: Genetic counseling to determine how to approach family screening; this is complex.

Tx: Early cancer surveillance with colonoscopy and endoscopy, endometrial biopsy, CA 125 level, transvaginal ultrasound (± prophylactic hysterectomy and salpingo-oophorectomy) + annual dermatologic exam + annual U/A.

SCRIPT

Intubated patient on TPN suddenly develops:

- New fever
- Abdominal distention and pain
- $\pm$ Jaundice
- $\uparrow$ WBC (Differential: $\uparrow$ Neutrophils and band forms)
- $\uparrow$ Alk phos, T. bili., AST, and ALT
- Normal amylase
- Abdominal KUB: No free air
- Abdominal U/S: No stones or sludge, thickened gallbladder wall with pericholecystic fluid
- HIDA scan: Unable to visualize gallbladder

What is the diagnosis?

Diagnosis is **acalculous cholecystitis**.

It's a pretty sure bet that if you see a clinical scenario containing the words "ICU" (or the equivalent, such as "intubation," "ventilator," "TPN," or the like ...) and "HIDA scan," the diagnosis is acalculous cholecystitis.

Dx: Clinical + abdominal U/S ± HIDA scan + blood cultures.

Tx: Supportive + empiric broad-spectrum antibiotics + eventual cholecystectomy.

SCRIPT

Elderly man with h/o ischemic cardiomyopathy presents with biventricular failure. He receives O₂ and diuretics and then develops:

- Confusion
- Hours of rapidly progressive periumbilical abdominal pain
- Vomiting
- Initial soft abdomen → distended with guarding
- No bloody stools

What is the diagnosis?

Diagnosis is **acute mesenteric ischemia**.

Another tough script. The clues are all in the history: A sick patient with a history of stenotic vessels comes in and receives aggressive diuresis, which drives a low-flow state in the intestines. These patients, unlike those with ischemic colitis, frequently do not have lower abdominal pain or hematochezia, but their pain is more severe, and they appear sicker. Be familiar with the association of this same clinical presentation in patients with atrial fibrillation and atrial thrombi that embolize to the mesenteric vessels. Many patients give a history of chronic intestinal angina prior to the acute event.

Dx: Clinical + mesenteric CT or MR angiography.

Tx: Supportive + empiric broad-spectrum antibiotics + anticoagulation or embolectomy + early surgery for any potential complication.

SCRIPT

Known alcoholic presents with several hours (or days) of:

- Intractable nausea and vomiting
- Epigastric pain that radiates to the back and improves with leaning forward
- $\pm$ Fever
- $\pm$ Left pleural effusion
- $\pm$ Bruising in the flank or around the umbilicus
- $\pm$ $\uparrow$ WBC (Differential: $\uparrow$ Neutrophils and band forms)
- $\uparrow$ Amylase
- $\pm$ $\uparrow$ AST and ALT
- $\pm$ $\uparrow$ T. bili and alk phos
- Abdominal KUB: No free air

What is the diagnosis?

Diagnosis is **acute pancreatitis**.

Remember that gallstones can cause acute pancreatitis too, so a history of colicky RUQ pain would be important. In gallstone pancreatitis, you would see the increase in the alk phos and T. bili, but otherwise, they are often normal. If the pancreatitis is due to alcohol use, then the AST and ALT may also be increased. The Grey-Turner sign (flank) and Cullen sign (periumbilical) are seen in severe cases.

Dx: Clinical + pancreatic enzymes + abdominal plain film (excludes perforation or obstruction; may show "sentinel loop" or ileus) + CXR (left sided pleural effusion) + abdominal U/S ± contrasted CT abdomen.

Tx: Supportive + pain control (meperidine or fentanyl) + nothing by mouth until pain is gone in mild cases then resume soft diet or nasojejunal feeds within 72 hours in severe cases + close observation for development of complications (necrosis, pseudocyst, abscess).



Male patient with h/o ulcerative colitis develops:

- Fatigue
- Diffuse skin itching
- $\pm$ RUQ pain
- $\uparrow$ Serum alkaline phosphatase
- AST and ALT < 300 IU/L
- Normal albumin
- + pANCA
- Negative antimitochondrial antibodies
- Negative IgG4 antibodies
- Cholangiography: Multifocal strictures, dilated intra- and extrahepatic ducts

What is the diagnosis?

Diagnosis is **primary sclerosing cholangitis**.

~ 5% of patients will develop PSC; however, most of the cases of PSC are due to UC. Don't confuse PSC (negative antimitochondrial antibodies) with primary biliary cirrhosis (positive antimitochondrial antibodies). Certainly, in real life, an increased alk phos could be due to a lot of causes, but in an exam scenario related to UC, the objective most likely is to determine if you know the association with PSC. IgG4 antibodies, what are those? This is a relatively new test that can help exclude "immunoglobulin G4-associated cholangitis" (a new disease entity that is steroid-responsive) as a cause of a PSC presentation. GI experts are now recommending this test be done before diagnosing PSC in any patient. Patients with UC and PSC are at very high risk for colon cancer.

Dx: Clinical + cholangiographic findings.

Tx: Treatment of UC + liver transplant. American Association for the Study of Liver Disease recommends against ursodeoxycholic acid.

SCRIPT

Previously healthy patient presents with gradual:

- Weight loss, fatigue, fevers
- Crampy abdominal pain
- Diarrhea $\pm$ bleeding and tenesmus
- Oral aphthous ulcers
- $\downarrow$ Hgb, Hct, MCV, MCHC, serum Fe, serum Fe/TIBC
- Negative *C. difficile* toxin assay
- Negative stool O&P
- Negative stool cultures
- + *Saccharomyces cerevisiae* Ab
- Negative pANCA
- UGI with SBFT: Multiple ulcerations and "cobblestoning," transmural thickening
- Colonoscopy: Areas of inflammation, wall thickening, superficial ulcerations; skip lesions; no rectal disease
- Bowel pathology: Crypt abscesses and noncaseating granulomas with skip areas

What is the diagnosis?

Diagnosis is **Crohn disease**.

A case could include any of the other systemic manifestations of Crohn's such as spondyloarthropathy, uveitis, erythema nodosum, pyoderma gangrenosum, and biliary tract involvement (e.g., primary sclerosing cholangitis that presents with an increased alk phos and GGT, but this is more commonly caused by ulcerative colitis). Remember that the antibody tests are not 100% specific; but generally, Crohn's patients have anti-*Saccharomyces cerevisiae* antibodies and lack pANCA.

Dx: Clinical + radiology (UGI with SBFT, contrasted CT, or endoscopy/colonoscopy "cobblestoning" with skip lesions) with biopsies (crypt abscesses and granulomas, especially involving the terminal ileum).

Tx: Oral meds for mild disease (5-ASA drugs, sulfasalazine $\pm$ antibiotics) + prednisone/budesonide for mild-to-moderate or refractory disease + immunomodulators for more severe or disease refractory to all other meds (azathioprine, methotrexate, biologics) $\pm$ surgical treatment.

SCRIPT

Healthy, middle-aged patient, who has never had problems digesting foods in the past, now presents with:

- Diarrhea, flatulence, and abdominal bloating with discomfort for 1–2 hours after ingesting most dairy products
- No issues with ingesting small quantities of dairy with meals
- Breath hydrogen test: Negative

What is the diagnosis?

Diagnosis is **lactose intolerance**.

Don't be fooled by the onset of lactose intolerance in middle-age. This happens. And don't be fooled by the patient's ability to ingest dairy in small quantities—they are still probably intolerant. Most patients can handle dairy in small quantities, mixed with other foods or scattered throughout the day. But they often become symptomatic with a large intake of dairy at one time. The breath hydrogen test is not always abnormal in a patient with lactose intolerance.

Dx: Clinical + elimination diet + positive result from one of 2 tests (lactose breath hydrogen test or lactose tolerance test; note high number of false-negative tests in both).

Tx: Goal is to eliminate symptoms with restricting intake of lactose and adding supplementary enzyme, lactase, via pills or liquid + calcium and vitamin D supplements. Occasionally lactose can be reintroduced into the diet of lactose-deficient patients in small amounts and gradually increased.

SCRIPT

Otherwise healthy patient presents with:

- Diarrhea and abdominal cramping
- Increased intake of sugar-free mints

What is the diagnosis?

Diagnosis is **sorbitol-induced diarrhea**.

You may have guessed irritable bowel syndrome, but know that you can't make that diagnosis until you've excluded sprue and excess sorbitol intake.

Dx: Clinical.

Tx: Discontinue excess sorbitol intake.

SCRIPT

Patient < 40 years of age presents with:

- Recurrent papulovesicular rash on the thorax and extremities
- ± Voluminous stools or foul-smelling and floaty diarrhea
- ↓ Hgb, Hct, MCV, MCHC, serum Fe, serum Fe/TIBC
- + Anti-tTG antibodies

What is the diagnosis?

Diagnosis is **celiac disease**.

A clinical case could also include association of celiac disease with autoimmune hypothyroidism, osteoporosis and osteopenia, Type 2 diabetes, selective IgA deficiency, and a nonspecific increase in liver transaminases. Always think celiac disease when you see this blistering rash (dermatitis herpetiformis) in the same clinical scenario as an iron deficiency anemia.

Dx: Clinical + serum antiendomysial antibody ± IgA antitissue transglutaminase antibody ± duodenal biopsy when serum antibodies are present (all performed while on gluten-rich diet). Antigliadin antibodies are less specific.

Tx: Gluten-free diet

SCRIPT

Middle-aged, male smoker with FH of pancreatic cancer presents with:

- Weight loss
- Fatty floating stools
- Jaundice
- ↓ Hgb and Hct
- ↑ Serum alkaline phosphatase, T. bili, and D. bili
- ± Positive CA 19-9

What is the diagnosis?

Diagnosis is **pancreatic cancer**.

Patients who present with the features of this script (painless jaundice and steatorrhea) usually have tumors in the head of the pancreas and are operable candidates, but patients with cancers in the body or tail often present with weight loss and epigastric pain that radiates to the back. These tumors are less successfully resected. As disease progresses, you could add the following to the illness script:

- Hypercoagulable state
- Palpable abdominal mass
- Malabsorption of fat-soluble vitamins (A, D, E, K)

Remember the epidemiologic associations of cigarette smoking and family history with pancreatic cancer.

Dx: Clinical + serum transaminases, alkaline phosphatase, and bilirubin + imaging (abdominal U/S if jaundiced or contrasted CT [triple phase pancreas protocol] if not jaundiced) + serum CA 19-9 level + biopsy + TNM staging.

Tx: Resection ± chemotherapy ± radiation.

SCRIPT

Elderly patient with multiple diverticula presents with:

- Bloating
- Watery diarrhea
- Dyspepsia
- Weight loss
- ↓ Hgb and Hct
- ↑ MCV
- ↑ folate and vit K
- ↓ B₁₂ level
- ↓ 25-(OH)₂- D
- DXA scan: T-score < -2.5
- UGI with SBFT: Delayed motility
- Lactulose breath hydrogen test: Abnormal (early rise in hydrogen production)

What is the diagnosis?

Diagnosis is **bacterial overgrowth**.

This condition can occur when there is stasis in the intestines or an abnormal communication between intestinal loops that allows for overgrowth of bacteria. E.g., post-op blind loop, decreased peristalsis, strictures, many diverticula, or a systemic disease such as systemic sclerosis.

Dx: Clinical + serum B₁₂ level (low) + serum folate (increased) + empiric treatment (rapid improvement) ± breath hydrogen testing (early rise in hydrogen production). The [14C]-D-xylose breath test is more sensitive and specific than the breath hydrogen test, but it is not as commonly performed. If the patient undergoing endoscopy, obtains duodenal aspirate and check quantitative culture (> 100,000 CFU) is diagnostic.

Tx: Treat any underlying systemic disease + discontinue drugs that slow bowel function (e.g., narcotics, benzos) + discontinue acid suppressors + avoid lactose and high carbohydrate diet + rifaximin x 10 days.



SCRIPT

Young female patient presents with:

- Intermittent crampy abdominal pain, worse with stressful situations, better with defecation, and never wakes her from sleep
- Alternating loose, mucoid stools and constipation
- $\pm$ Belching
- No anorexia or weight loss
- Normal CBC, chemistry, and serum Ca, Mg, and PO_4

What is the diagnosis?

Diagnosis is **irritable bowel syndrome**.

This script contains no alarm symptoms. If any of the following are present, it's not IBS: Rectal bleeding, nighttime pain, weight loss, anemia, increased ESR, potassium or calcium derangements.

Dx: Clinical and of exclusion.

Tx: "Establish a therapeutic relationship with the patient" (avoid judgment, create boundaries, set expectations, involve the patient in treatment decisions) + diet that avoids foods known to exacerbate symptoms + fiber $\pm$ antispasmodic drugs (dicyclomine, hyoscyamine, or peppermint oil) $\pm$ antidepressants $\pm$ lubiprostone or linaclotide.

SCRIPT

Young patient, 20–30 years old, with FH of colon cancer has:

- Screening colonoscopy: > 100 adenomatous colorectal polyps

What is the diagnosis?

Diagnosis is **familial adenomatous polyposis**.

The presence of > 100 adenomatous polyps makes this diagnosis. Genetic testing would then be done to look for a mutation, although not everybody with FAP has one. Gardner syndrome is FAP plus extraintestinal signs/symptoms such as desmoid tumors, epidermoid cysts, lipomas, and osteomas.

Dx: Family history + testing for presence of adenomatous polyposis coli (*APC*) gene in patient and family members.

Tx: Colectomy if "profuse" number of polyps, several large ones > 1 cm, or villous or high-grade dysplastic polyps + surveillance of UGI with endoscopy at ~ age 20 + surveillance for thyroid tumors with annual physical exam.

SCRIPT

Middle-aged patient presents with several days of:

- LLQ abdominal pain
- Fever
- Vomiting
- $\pm$ Diarrhea
- $\pm$ Tender LLQ mass
- Normal or $\uparrow$ WBC
- Normal AST, ALT, Albumin, T. bili, alk phos, amylase, and U/A
- Recent screening colonoscopy: Few diverticula

What is the diagnosis?

Diagnosis is **diverticulitis**.

CT results showing inflamed diverticula might be included in the clinical scenario. Don't mix this up with "diverticulosis," which does not have fever or signs of inflammation.

Dx: Clinical and of exclusion $\pm$ contrasted CT abdomen (alternative is water-soluble contrast enema); colonoscopy should be performed after the patient is well from the acute event ($\sim$ 6 weeks) if imaging is not performed while sick.

Tx: Clear liquids + antibiotics (cipro + metronidazole, amp-clavulanic acid, or amp/sulbactam) + careful observation for symptoms of complication (obstruction, perforation, abscess).



SCRIPT

Patient with h/o ischemic heart disease, recent STEMI and CABG, presents with:

- Hours of mild LLQ pain
- Hematochezia
- Negative *C. difficile* toxin assay
- Abdominal CT with IV contrast: Normal
- Colonoscopy without prep: Pale mucosa, petechial bleeding, $\pm$ hemorrhagic blue nodules

What is the diagnosis?

Diagnosis is **ischemic colitis**.

This is a tough script and a tough diagnosis to make in clinical practice. Rectal bleeding in a patient with this sort of medical history needs investigating. You might have guessed diverticular bleed, which is certainly in the differential but would have different findings on colonoscopy (diverticulitis does not usually cause hematochezia and diverticular bleeding is painless). You might have guessed acute mesenteric ischemia, which is also reasonable, but those patients have much more severe abdominal pain, hypotension, and are much sicker.

Dx: Clinical + CT abdomen with IV contrast (often normal during initial course) + colonoscopy (without bowel prep) ± evaluation for inherited thrombophilia if young or with recurrent disease.

Tx: Supportive care + empiric broad-spectrum antibiotics if moderate-to-severe + careful observation of complication that would require surgical intervention (necrotic bowel with peritonitis or perforation) ± anticoagulation if young or with recurrent disease.



SCRIPT

Middle-aged smoker with known ischemic heart disease and hyperlipidemia develops:

- Dull, cramping abdominal pain that develops ~ 1 hour after eating; worse with fatty meals
- Weight loss due to avoiding meals
- $\pm$ Abdominal bruit
- Abdominal U/S: Normal

What is the diagnosis?

Diagnosis is **chronic mesenteric ischemia**.

This is a tough diagnosis in clinical practice because all types of workups are initiated to elucidate the cause of the weight loss. But on the Board exam, pay special attention to risk factors for vascular disease and when the pain occurs: After eating, in a patient with a history of arterial stenoses, and no gallstones.

Dx: Clinical and of exclusion + CT or MR angiography (stenosis of mesenteric vessels).

Tx: Surgical revascularization.

SCRIPT

Woman older than 30 years presents with the gradual onset of:

- Fatigue
- Itching skin
- Jaundice and/or melanin hyperpigmentation of the skin
- Hepatomegaly
- ↑ Alkaline phosphatase, GGT, and T. bili
- Normal or ↑ AST and ALT
- Positive antimitochondrial antibodies

What is the diagnosis?

Diagnosis is **primary biliary cirrhosis**.

Hopefully, you read, "Woman, itching, jaundice ..." and quit because you knew the diagnosis. This one is easy because nothing else presents like it. > 90% of these patients are women. If you missed it, it's probably because you mix up primary biliary cirrhosis with primary sclerosing cholangitis. PSC occurs at increased incidence in patients with ulcerative colitis. Here's a tip (written by a woman!): Women rack up a lot of "bills" (... Get it? Biliary.) OK, it's not the most politically correct association, but it'll help you remember.

Dx: Clinical + liver transaminases (normal or slightly increased) + alkaline phosphatase (very increased) + bilirubin (increased in late disease) + antimitochondrial antibodies + liver biopsy (destruction of bile ducts due to nonsuppurative process).

Tx: Ursodeoxycholic acid indefinitely ± colchicine ± methotrexate ± liver transplant.

SCRIPT

Injection drug user presents with several days of:

- Fatigue
- Malaise
- Anorexia
- RUQ pain
- ↑ AST and ALT
- Normal T. bili, alk phos, albumin
- + HBsAg
- +HBcAb IgM
- ± +HBcAb IgG
- Negative HBsAb
- Negative HAV IgM
- Negative HCV

What is the diagnosis?

Diagnosis is **acute hepatitis B**.

The existence of surface antigen and anti-core IgM antibody confirms acute infection. With time, the patient will develop anti-core IgG and seroconvert to positive surface antibody.

Dx: Clinical + liver transaminases (increased) + HBsAg ± HBcAb IgM.

Tx: Most patients with acute HBV infection recover, and do not develop chronic HBV, so symptomatic care is all that is required.



SCRIPT

2–4 weeks after eating raw oysters in New Orleans, a previously healthy patient presents with:

- Nausea and vomiting
- Fatigue
- RUQ pain
- Jaundice
- Dark urine
- Hepatomegaly
- ↑ AST, ALT, T. bili, and alka phos
- + HAV IgM
- Negative HBsAg, HBcAb IgM and IgG, HBsAb
- Negative HCV

What is the diagnosis?

Diagnosis is **acute hepatitis A**.

Raw oysters from the Gulf coast have been implicated in HAV outbreaks. Fecal/oral spread; acute, self-limited; very rarely causes fulminant hepatic failure.

Dx: Clinical + HAV IgM.

Tx: Supportive with isolation only for patients with fecal incontinence + post-exposure prophylaxis of close contact up to two weeks after exposure with immunoglobulin and vaccination.



SCRIPT

Patient with known autoimmune hypothyroidism presents with several weeks of:

- Fatigue
- Nausea
- Malaise
- Nebulous abdominal pain
- Intermittent skin itching
- Arthralgias
- ↑ AST and ALT with milder ↑ in T. bili and alk phos
- ↑ T. protein
- Negative hepatitis panel
- Normal serum ferritin
- + : ANA, anti-smooth muscle and antiactin antibodies
- ± Antimitochondrial antibodies
- Liver biopsy: Fibrosis and inflammatory cell infiltrates (nonspecific findings)

What is the diagnosis?

Diagnosis is **autoimmune hepatitis**.

Don't confuse anti-smooth muscle antibodies with the anti-Sm (also called "anti-smith") antibodies seen in systemic lupus. "Anti-Sm" is not an abbreviation for "anti-smooth muscle." These are different antibodies. In patients with antimitochondrial antibodies, **cholangiography** will help you distinguish between AH and PBS. And, PBS does not have all of the additional antibodies seen in AH. If you get stuck in a Board question, look at the total protein. It's probably not autoimmune hepatitis if the T. protein is normal.

Dx: Clinical and of exclusion + liver transaminases (increased) + T. protein (increased) + liver biopsy + evidence of autoantibodies (ANA, anti-smooth muscle, anti-soluble liver antigen, and antiactin).

Tx: Variable based on extent of disease; glucocorticoids ± azathioprine or 6-mercaptopurine + vaccination against hepatitis viruses + liver transplant for advanced disease.

SCRIPT

Obese patient, 40–60 years old, with T2DM and hyperlipidemia develops:

- Vague RUQ pain $\pm$ hepatomegaly
- $\uparrow$ AST and ALT (AST:ALT < 1)
- Normal or mild $\uparrow$ alk phos and normal T. bili
- Negative hepatitis panel
- Normal serum ferritin
- Negative ANA

What is the diagnosis?

Diagnosis is **nonalcoholic fatty liver disease**.

This is sometimes a tough diagnosis to make in clinical practice, but on the Board exam, you can feel comfortable about the diagnosis when you see the history of obesity, diabetes, and increased lipids. Progression to cirrhosis is variable.

Dx: Clinical and of exclusion (exclude hepatitis viruses, hemochromatosis, autoimmune hepatitis, celiac disease, and alcohol use) $\pm$ liver biopsy.

Tx: Weight loss + vaccination against hepatitis viruses + maximization of control of HTN, diabetes, and hyperlipidemia + avoidance of alcohol + Vitamin E 800 U/day (if not diabetic) + screening for hepatocellular carcinoma.

SCRIPT

Chronic alcoholic with known cirrhosis and stable ascites develops:

- Fever
- Confusion
- Nontender abdomen
- ↑ WBC (Differential: ↑ Neutrophils with band forms)
- Ascites fluid: ↑ WBC with ↑ absolute neutrophils ≥ 250 cells/mm³

What is the diagnosis?

Diagnosis is **spontaneous bacterial peritonitis**.

Abdominal pain is not always a feature of SBP. Think about SBP in any cirrhotic with low-protein ascites who develops fever. The challenge is differentiating SBP from secondary BP caused by an intraabdominal infection.

Dx: Clinical + Gram stain and culture of ascites fluid (inoculate blood culture bottles with at least 10 mL using a new needle) + analysis of ascites (cell count and differential with absolute PMN count ≥ 250 cells/mm³ = SBP; serum-ascites albumin gradient: Serum albumin – Ascites albumin > 1.1 = portal HTN; T. protein = low, correlating with very dilute ascites; glucose = > 50 mg/dL in SBP and lower in secondary BP; LDH = increased in SBP and very increased in secondary BP; and, amylase = increased only in pancreatitis and gut perforations as a cause of secondary BP).

Tx: Broad-spectrum empiric antibiotic, such as cefotaxime or quinolone; avoid quinolone antibiotic if the patient was treated with a quinolone for prophylaxis + intravenous albumin $\pm$ intermittent or continuous prophylaxis with norfloxacin or ciprofloxacin, or TMP/SMX (controversial).



SCRIPT

Patient < 30 years of age presents with:

- Resting tremor
- Rigidity
- Ataxia
- Inappropriate grinning
- Drooling
- Dark rings around the iris in both eyes
- $\pm$ Hepatosplenomegaly
- $\uparrow$ AST and ALT $\pm$ T. bili and alkaline phosphatase

What is the diagnosis?

Diagnosis is **Wilson disease**.

The iris findings are Kayser-Fleischer rings. Think about Wilson's when you see the combination of neuropsychiatric disease and liver disease. Young patients present with liver disease, while older patients present with psychiatric symptoms, usually.

Dx: Clinical + serum ceruloplasmin concentration + 24-hour urinary copper excretion + slit-lamp exam.

Tx: D-penicillamine (copper chelator) + oral zinc (inhibits copper absorption) + reduce intake of foods high in copper (shellfish, organ meats, nuts, mushrooms, and cocoa [especially chocolate]) ± liver transplant; prognosis is excellent for patients receiving treatment and fatal if not diagnosed.



SCRIPT

Diabetic patient presents with:

- Cheilitis
- Glossitis
- Confusion
- Mood alterations

What is the diagnosis?

Diagnosis is **pyridoxine (B₆) deficiency**.

This is a hard script because, in clinical practice, diabetics could have a number of reasons for pain in their mouths and confusion. On the Board exam, when you see a painful mouth, always think about vitamin deficiencies, especially when the question does not contain any reference to the presence of thrush. The Board exam is unlikely to give you a script of purely erythematous thrush (without the white patches). When you see a painful, erythematous mouth, think about partial B₆ deficiency or B₂ deficiency. Complete deficiency of B₆ (rare) can also present with vomiting and seizures.

Dx: Clinical $\pm$ mean plasma pyridoxal-5 phosphate concentration, erythrocyte transaminase activity, urinary excretion of 4-pyridoxic acid, and urinary excretion of xanthurenic acid.

Tx: Nutritional supplementation.

SCRIPT

Patient with lactose intolerance or anorexia presents with:

- Cheilitis
- Glossitis
- ↓ Hgb and Hct with normal MCV and MCHC
- Seborrhea

What is the diagnosis?

Diagnosis is **riboflavin (B₂) deficiency**.

Dairy is a good source of riboflavin. Be aware of the effects of deficiency. Patients with celiac disease also may present with riboflavin deficiency. Be careful not to confuse B₂ and marginal B₆ deficiency, which also has the cheilosis and glossitis but does not have anemia and seborrhea. Complete B₆ deficiency also results in vomiting and seizures.

Dx: Clinical + urinary riboflavin excretion + erythrocyte glutathione reductase assay ± serum riboflavin concentration.

Tx: General nutritional supplementation; Note that this deficiency often occurs with other deficiencies in malnourished individuals.

SCRIPT

Known anorexic or alcoholic develops:

- Diffuse hyperpigmented rash that resembles a sunburn
- Diarrhea
- Anxiety, insomnia, delusions

What is the diagnosis?

Diagnosis is **niacin (B₃) deficiency (pellagra)**.

The 3 Ds of pellagra: Dermatitis, diarrhea, dementia. Don't forget that pellagra can be seen in patients with carcinoid syndrome. This deficiency is rare in the U.S. and occurs most commonly in alcoholics.

Dx: Clinical $\pm$ assessment of the whole blood niacin number (ratio of NAD/NADP x 100).

Tx: Supplement of high-dose niacin.



SCRIPT

Homeless drug abuser presents with:

- Cachexia and weakness
- Spontaneous ecchymoses
- Bleeding gums
- Petechiae
- Pinpoint brownish discoloration around hair follicles
- Hair coiling

What is the diagnosis?

Diagnosis is **vitamin C deficiency (scurvy)**.

This is a very strange set of signs and symptoms. And it probably would be very difficult to make this diagnosis in a malnourished homeless drug user, because you'd be considering all of the other diagnoses that can cause petechiae and bleeding. In an exam setting, don't forget scurvy in patients who appear malnourished.

Dx: Clinical + serum concentration of ascorbic acid.

Tx: Supplemental replacement of vitamin C + improvement in nutritional status.

SCRIPT

Malnourished immigrant has the following findings:

- Night blindness
- Pinpoint brownish discoloration around hair follicles
- Poor bone growth

What is the diagnosis?

Diagnosis is **vitamin A deficiency**.

Night blindness is the key word for this condition. This is very rare in the U.S.

Dx: Clinical + serum retinol concentration.

Tx: High-dose supplementation of vitamin A.



SCRIPT

Health-conscious patient who takes multiple “mega” vitamins and supplements presents with:

- Alopecia
- Diffuse myalgias and bone pain
- Ataxia
- Hepatosplenomegaly

What is the diagnosis?

Diagnosis is **chronic vitamin A overdose**.

Along with excess vitamin D, this is one vitamin that you have to worry about if overdose occurs with supplements. Vitamin D excess can cause stones.

Dx: Clinical; don't measure vitamin A (retinol) levels as they are not helpful.

Tx: Discontinue vitamin A supplements and avoid vitamin A rich foods (organ meats and egg yolk) + supportive care.



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SCRIPT

Older woman with osteoporosis on long-term bisphosphonates (> 9 years) develops:

- Jaw pain
- Ulcer with exposed mandibular bone (noted by her dentist)

What is the diagnosis?

Diagnosis is **Osteonecrosis of the Jaw (ONJ)**.

ONJ typically presents as painful, nonhealing lesions with exposed bone in the mandible (most common) or maxilla that have been present > 8 weeks. ONJ has been linked to bisphosphonates, particularly in cancer patients who have received high-dose IV bisphosphonates for hypercalcemia or in patients who undergo dental extractions. Rarely, spontaneous lesions can occur in patients who have been on long-term bisphosphonates or denosumab.

Dx: Clinical.

Tx: Conservative management—suspend bisphosphonates, treat infection if present; there have been reports that teriparatide may be helpful. Avoid surgical debridement of dead bone as this will only worsen the condition.

SCRIPT

Patient with osteoporosis on long-term bisphosphonates (> 9 years) and on chronic steroids develops:

- Acute bilateral thigh and groin pain after walking down stairs

What is the diagnosis?

Diagnosis is **atypical subtrochanteric femoral fractures**.

Atypical subtrochanteric femoral fractures have been reported in patients on long-term bisphosphonates; these fractures are atypical because they occur below the trochanter, whereas typical osteoporotic fractures occur in the intertrochanteric region or femoral neck. It is speculated that long-term (> 6 years) bisphosphonate use can impair bone remodeling, resulting in microfractures and bone fragility.

Dx: X-rays, clinical history.

Tx: Consider giving patients a drug holiday of 1–2 years after 5 years of continuous bisphosphonate use.

SCRIPT

28-year-old pregnant woman presents very drowsy and barely responsive. She was fine all morning but went to tidy up her brother's garage/workshop. It was a cold day, and so most of the windows were shut. Her brother runs a gasoline generator in his workshop for power supply.

- Acute onset of headache and nausea
- Drowsiness but moving all limbs.
- Normal vital signs: SPO_2 is 98%. ABG shows a normal P_{O_2} .

What is the diagnosis?

Diagnosis is **carbon monoxide poisoning**.

The keys here: Previously well, exposure to a gas generator with poor ventilation, HA, N/V, and depressed consciousness. Remember that a high index of suspicion is crucial. The SpO_2 is normal because pulse oximetry cannot differentiate between oxyhemoglobin and carboxyhemoglobin (COHb). The P_{O_2} is normal because the value dissolved in blood is not affected by COHb. The hemoglobin-bound O_2 is what is reduced by COHb. A delayed neuropsychiatric syndrome occurs in 40% patients, especially if +LOC. This includes cognitive/focal deficits, personality changes, and movement disorders, which can last up to a year. Breathing room air, the half-life of COHb is 300 minutes; it is reduced to 90 minutes with high-flow O_2 (100%) and down to 30 minutes by hyperbaric O_2 .



SCRIPT

In a randomized controlled clinical trial, 3.2% of patients who took drug X had a myocardial infarction over 5 years as compared to 5.6% in patients taking a placebo.

What is the number needed to treat with drug X to prevent one additional myocardial infarction over 5 years?

The number needed to treat is **42**.

Number needed to treat (NNT) is a useful statistical representation that shows the clinical relevance of a particular outcome of a study. The NNT can be easily calculated as follows:

1) Calculate the absolute risk reduction (ARR)

$ARR = \text{experimental event rate} - \text{control event rate}$

2) Calculate the NNT

$NNT = 1/ARR$

In our example:

$ARR = 5.6\% - 3.2\% = 2.4\%$

$NNT = 1/ARR = 1/2.4\% = 1/.024 = 42$

In other words, you would need to treat 42 patients for 5 years with drug X to see one less myocardial infarction.



SCRIPT

Patient on chronic warfarin for anticoagulation is given trimethoprim/sulfamethoxazole for acute sinusitis.

What can you expect to happen to the patient's INR?

The INR **will increase**.

Remember that certain drugs can potentiate the effects of warfarin and increase the INR, especially sulfamethoxazole, amoxicillin, macrolide antibiotics, fluconazole, metronidazole, and many herbal preparations. The combination of NSAIDs and acetaminophen also is associated with clinical bleeding, even though the INR is not affected by them.

SCRIPT

Patient with CHD who takes an ace-inhibitor, beta-blocker, nitrates, and an HMG-CoA reductase inhibitor develops myalgias.

Excess intake of what food can cause this condition?

Excess intake of **grapefruit**.

You probably know that statins can cause a myopathy with myalgias. You have to also remember that an HMG-CoA reductase inhibitor is a statin drug. The statins most responsible for inducing myopathy are lovastatin and simvastatin. Remember that grapefruit intake should be limited to no more than 1/2 grapefruit/day or no more than 8 ounces of juice per day in patients who take statin drugs because of the risk of myopathy. The risks of adverse effects are also increased when statins are combined with either fibrates or niacin. In patients who must take a statin drug in combination with a fibrate, the combination of pravastatin and fenofibrate is recommended.



SCRIPT

Diabetic patient on metformin and pioglitazone develops:

- New-onset weight gain
- Paroxysmal nocturnal dyspnea
- Orthopnea
- Lower extremity edema

What is the diagnosis?

Diagnosis is **heart failure due to pioglitazone**.

Certainly, a diabetic could have many reasons for new onset HF. But remember the side effect of the thiazolidinediones (or "thioglitazones"). Side effects and contraindications include: hypoglycemia when combined with insulin or sulfonylureas, fluid retention and weight gain (especially when given with insulin), osteoporosis and non-osteoporotic fractures (especially in women), HF (contraindicated in patients with NYHA classes 3 and 4), and bladder cancer (CI if personal or FH of bladder cancer). While we're on the subject of these meds, don't forget about the side effects and CI of metformin: diarrhea, lactic acidosis (hold doses in patients going to surgery or getting IV contrast dye and in anybody with acute kidney injury or with chronic kidney disease who becomes ill), induction of B₁₂ deficiency (relatively new observation; think about it in the diabetic on metformin who gets neuropathy), and do not use in patients with HF or low creatinine clearance (exact GFR is debatable; < 60 cc/min is package insert, but some experts reference < 30 cc/min).

Dx: Clinical ± echocardiogram

Tx: Discontinuation of thiolglitazone + control of blood pressure + diuretic ± inotrope



SCRIPT

Elderly patient with DM, HTN, and stable systolic dysfunction is prescribed naproxen to control OA pain in his hands.

Within two weeks, he develops:

- New-onset weight gain
- Paroxysmal nocturnal dyspnea
- Orthopnea
- Lower extremity edema

What is the diagnosis?

Diagnosis is **heart failure due to NSAIDs**.

Remember that, if at all possible, NSAIDs should not be prescribed to elderly patients with a history of HF because NSAIDs cause sodium retention and systemic vasoconstriction which increase afterload.

SCRIPT

Middle-aged, Caucasian, female smoker, with h/o of premature ovarian failure, complains of pain in her back and presents with:

- BMI 18
- Excess alcohol use on weekends
- Normal CBC and serum chemistries
- Normal chest radiograph
- Plain radiographs: Compression fracture

What is the diagnosis?

Diagnosis is **osteoporosis**.

Remember systemic associations: IBD, celiac disease, gastric bypass, h/o gastrectomy, primary hyperparathyroidism, Cushing's, hypogonadism, CKD, prolonged confinement, RA, SLE, anorexia. Common drugs that cause: Glucocorticoids, overreplacement with levothyroxine, lithium, phenobarbital, phenytoin, depomedroxyprogesterone, aromatase inhibitors, methotrexate, and cyclosporine. Recs for DXA screen in females: 1) age > 65, 2) postmenopausal female with 1 of the following RFs: self or 1st degree relative with fragility fx, BMI $\leq$ 20, current smoker > 1 ppd, > 2 alcoholic drinks/day, premature ovarian failure, current or previous use of prednisone $\geq$ 5 mg/day x > 3 months. DXA screen in males: 1) age 70 and older, 2) earlier if any RF: low testosterone, alcoholism, glucocorticoid Rx, systemic disease.

Dx: Hip T-score of -2.5 SD or less; osteopenia is T-score -1.0 to -2.5 SD. Treat if osteopenia + fx or secondary cause. Treat if osteoporotic + 10-yr prob of hip fx > 3% of 10-yr prob of any major fx > 20% (use U.S.-adapted WHO algorithm).

Tx: Ca/Vit D + weight-bearing exercise $\pm$ (controversial!) HRT (raloxifene if h/o breast Ca) + bisphosphonate (alendronate, ibandronate, or risedronate) $\pm$ teriparatide (if high risk and unable to take bisphosphonate; limit to max use of 2 years). Bisphosphonates can cause muscle pain and may need to be d/c'd.



SCRIPT

Elderly patient presents with:

- Chronic back and extremity pain
- Tibial fracture after a fall
- Normal serum creatinine, Ca, and PO_4 , $\uparrow$ serum alka phos
- Normal AST, ALT, T. bili, I. bili, albumin, and GGT
- Plain radiographs of long bones: Thickening of bony cortex with areas of lucency, and sclerosis
- Bone scan: Multiple hot spots in the pelvis, skull, spine, and long bones

What is the diagnosis?

Diagnosis is **Paget disease**.

You might have guessed bone metastases, which is certainly a reasonable guess—especially in the clinical realm where patients don't always present with textbook diagnoses. In this script, however, there are no clues to point you toward a primary malignancy. And other specific clues are present to point you toward Paget's: Multiple areas of uptake in the common areas for Paget's (pelvis, skull, spine, long bones), radiolucencies of the skull, and an isolated increase in the alkaline phosphatase with normal serum calcium. Always think about Paget's in the elderly patient with isolated ↑ alka phos, especially if the case says anything about skull films.

Dx: Clinical + increased alka phos + radiographs of long bones (bony thickening, lytic and sclerotic areas), skull ("osteoporosis circumscripta"), and vertebrae ("picture frame" changes due to thickening of cortex on end plates) ± MRI/biopsy (excludes alternate diagnoses).

Tx: Oral alendronate, risedronate or tiludronate (take in a.m. before food and keep upright posture x 30 m after dose); IV zoledronic acid if severe disease. Injectable salmon calcitonin if unable to tolerate bisphosphonate.

SCRIPT

Previously healthy patient older than 60 years is brought in by family and presents with:

- Slowly progressive memory impairment, specifically for recent events
- Decreased motivation to engage in complex tasks
- Word-finding difficulty, difficulty naming objects, and rambling speech
- Episodes of getting “lost” in the home
- Lack of insight
- Normal cranial nerve, motor, sensory, and cerebellar exams
- Normal CT head

What is the diagnosis?

Diagnosis is **Alzheimer disease**.

The keys to diagnosis of this dementia are the slowly progressive onset and the early language and visuospatial deficits. Vascular (multi-infarct) dementia presents as worsening cognitive function associated with new neurologic deficits. Lewy body and frontotemporal dementias have early increased personality changes and, sometimes, hallucinations. This is true ALZ and not minor cognitive impairment because MCI includes impairment in only 1 domain of cognition and behavior and preservation of independence. This patient clearly has impairment in performance of ADLs.

Dx: Clinical and of exclusion with impairment in at least 2 domains of cognition and behavior: Memory, thought, visuospatial, language, personality. Do not use MRI findings to diagnose because the pathology on MRI and histology can be found in patients without any clinical evidence of ALZ!

Tx: Cholinesterase inhibitor (donepezil, rivastigmine, galantamine; improves cognitive and neuropsych Sxs) ± memantine; atypical antipsychotics increase mortality.



SCRIPT

Previously healthy elderly patient sustains a femoral neck fx.
In the post-operative period, he develops:

- Inability to focus and answer questions
- Fluctuating consciousness with periods of somnolence and lucidity
- Disorganized and tangential speech
- Visual and auditory hallucinations

What is the diagnosis?

Diagnosis is **delirium**.

The highest rates of post-op delirium are observed in elderly patients with hip fractures. Recognize this is not dementia because the cognitive impairment is acute and is associated with fluctuating consciousness (a classic sign of delirium).

Dx: Clinical (acute disturbance in consciousness [distracted, sleepy, lethargic] and thought [memory loss, disoriented, speech impairment] $\pm$ hallucinations [visual, auditory, tactile]) and of exclusion (with tabs targeted to medical and clinical history, including head imaging and lumbar puncture).

Tx: Treat underlying illness + supportive care (hydration that includes thiamine replacement, nutrition, prevention of skin breakdown, treatment of incontinence, reduce risk of aspiration). Manipulate the environment (light, reassurance, touch, reorientation) and use physical restraint as last resort.

Low-dose haloperidol is recommended for severe presentation. Avoid benzos, unless delirium caused by alcohol withdrawal.



SCRIPT

Patient with h/o recurrent strokes presents with:

- Worsening problems with remembering events of the week and getting lost in the neighborhood
- Difficulty in conversation with frequent hesitations and word searching
- Motor skills improvement after each stroke, but cognitive impairment worsens after each event

What is the diagnosis?

Diagnosis is **vascular (multi-infarct) dementia**.

Classic history is a stepwise decline in cognition, coincident with each new stroke. Patients often improve some in between strokes. Contrast this with the gradual, relentless onset of Alzheimer's. Remember that patients can develop dementia attributable to vascular disease, even if they have no discernible clinical history of stroke. This entity is called "subclinical (or silent) brain infarction." In these patients, MRI often shows evidence of multiple small vessel strokes.

Dx: Clinical and of exclusion; dementia is defined as impairment in 2 or more domains of thought and behavior: memory, thought, visuospatial, language, personality $\pm$ brain imaging (MRI or CT).

Tx: Reduce risk factors for stroke + supportive care.



SCRIPT

Elderly female with no PMH, who is socially isolated, presents with a 6-month h/o:

- Anhedonia
- Irritability
- Insomnia with early a.m. awakenings
- Anorexia with weight loss of < 10% body weight
- Flat affect
- Normal exam, CBC, serum chemistries, B₁₂, and folate levels

What is the diagnosis?

Diagnosis is **depression**.

If the case included use of prescription drugs or clues to a systemic illness, then the depression might be explained by an organic cause. Cases might include ruminative thinking of melancholic events, even delusions of persecution in severe cases. < 10% weight loss helps you exclude organic etiologies. Don't forget to exclude thyroid disease before making this diagnosis in the elderly! Certain depressed elderly patients are at increased risk for successful suicide, including those who are hopeless, aren't sleeping, are psychotic, are using alcohol or drugs, are agitated and restless, and who have chronic pain.

Dx: Clinical and of exclusion + TSH and FT_4 ; DSM IV diagnostic criteria for depression (need 5 or more, present daily for at least 2 weeks, and cannot be attributed to bereavement): Depressed mood, anhedonia, weight loss, insomnia, agitation or slowness, fatigue or energy loss, feeling unworthy or excessively guilty, problems with inattention/concentration, rumination about death.

Tx: Psychotherapy $\pm$ SSRI (not citalopram because prolongs QT) x 6–12 months.

SCRIPT

Patient presents, on prednisone and antibiotics after a recent exacerbation of COPD c/o:

- Inability to sleep through the night
- Multiple nightly awakenings
- Daytime fatigue, impaired concentration, and sleepiness
- Denies napping during the day

What is the diagnosis?

Diagnosis is **insomnia associated with medications**.

Many meds can cause insomnia; glucocorticoids are a classic cause. Important to distinguish true insomnia from volitional lack of sleep, which presents as daytime somnolence and napping at every opportunity. True insomnia occurs at least 3x/week, and patients are unable to sleep during the day as well.

Dx: Clinical.

Tx: Discontinue meds if able + supportive care



SCRIPT

Middle-aged patient presents c/o difficulty sleeping due to:

- Aching and “drawing” feelings in both legs
- ↓ Hgb, Hct
- ↓ Serum Fe and Fe/TIBC < 20%

What is the diagnosis?

Diagnosis is **restless leg syndrome**.

Remember the association between restless leg syndrome and iron deficiency anemia. Other causes of RLS: advanced CKD, DM, MS, Parkinson's, pregnancy, and venous insufficiency.

Dx: Clinical + serum Fe (low), Fe/TIBC (< 20% in IDA), reticulocyte count (low), and ferritin (low).

Tx: Iron replacement (even if not deficient; some patients respond) + avoid caffeine, nicotine, and alcohol ± benzos or gabapentin (mild, and in young people) ± pramipexole or ropinirole (dopa agonists).

Misc: Dopa agonists are associated with impulse problems, such as excessive gambling, excessive eating, and hypersexuality.

SCRIPT

Elderly patient presents with dizziness, falls, and the following:

- Cataracts
- Hearing deficit
- Dizziness that improves when holding onto the wall
- Abnormal Romberg with eyes closed but intact with eyes open
- Hesitant gait that becomes confident with a walker or cane

What is the diagnosis?

Diagnosis is **multisensory deficit disequilibrium**.

The clues in this case: Obvious sensory deficits (eyes, ears, etc.) and improvement with holding onto the wall or using an assist device. Also, true cerebellar disease is associated with an abnormal Romberg with eyes both closed and open.

Dx: Clinical.

Tx: Supportive; be sure to evaluate the drug list and try to discontinue any drugs that exacerbate sensory deficits and are associated with dizziness or volume contraction.



SCRIPT

Patient 40 years or older presents with:

- Dizziness, described as a sensation of motion that lasts < 1 minute and occurs intermittently
- Episodes provoked by moving the head or rolling over in bed
- Nausea and vomiting during some episodes
- Dix-Hallpike maneuver induces nystagmus

What is the diagnosis?

Diagnosis is **benign positional vertigo**.

The classic description of vertigo included in this case makes the diagnosis (short, episodic, induced by head movements). Nystagmus with the Dix-Hallpike maneuver is the defining feature.

Dx: Clinical + Dix-Hallpike maneuver.

Tx: Supportive + particle repositioning maneuvers (Epley, modified Epley, Semont, and modified Semont) with resolution over days to weeks.



SCRIPT

Patient presents with:

- Episodes of urinary leakage preceded by an abrupt urgency to void without other symptoms
- Pelvic exam: Normal
- U/A: Normal

What is the diagnosis?

Diagnosis is **incontinence: urge**.

Dx: Clinical + normal pelvic exam + U/A; urodynamics are not recommended.

Tx: Avoid excessive fluid intake + cut down or cease caffeine and alcohol + bladder training (frequent small volume voids with relaxation during urgency episodes) + pelvic muscle exercises ± anticholinergic (oxybutynin, tolterodine, fesoterodine).

Misc: Lots of side effects when using these anticholinergic drugs: Dry mouth, constipation, mental foggiess. Careful when combining with CYP3A4 inhibitors, such as fluconazole, azithromycin, and cyclosporine. Drugs are CI in patients with angle-closure glaucoma. They are not recommended for treatment of incontinence in the elderly.



SCRIPT

Woman in her 30s presents with:

- Urinary leakage associated with coughing and sneezing
- Pelvic exam: Normal
- U/A: Normal

What is the diagnosis?

Diagnosis is **incontinence: stress**.

Dx: Clinical + normal pelvic exam + U/A; urodynamics are not recommended.

Tx: Avoid excessive fluid intake + cut down or cease caffeine and alcohol + bladder training (frequent small volume voids with relaxation during urgency episodes) + pelvic muscle exercises. Currently, no drugs are recommended for treatment.



SCRIPT

Middle-aged or older male on no meds presents with:

- Feelings of incomplete bladder emptying after voiding
- Urinary hesitancy
- Urinary frequency (but urine only "dribbles")
- Normal GU exam and no prostatic nodules
- Normal U/A

What is the diagnosis?

Diagnosis is **benign prostatic hyperplasia**.

Remember that measurement of the PSA does not help with the diagnosis of BPH, and some men with severe obstruction have high PSA levels without prostate cancer. Also, men can have BPH and have normal or unimpressive prostate exams, so don't be dissuaded from this diagnosis if the exam doesn't reveal an enlarged prostate.

Dx: Clinical + normal PE ($\pm$ prostatic enlargement) + U/A (normal).

Tx: Treat only if the BPH affects patient's quality of life or causes outlet obstruction. Options: Alpha-antagonists (terazosin, doxazosin, tamsulosin, alfuzosin, silodosin) and 5-alpha-reductase inhibitors (finasteride, dutasteride).



SCRIPT

Patient with DM on hemodialysis:

- History of a painful diabetic foot infection
- Treatment with piperacillin-tazobactam and repeated meperidine injections for pain
- During treatment he develops a new seizure

What is the likely cause of the seizure?

The likely cause is **accumulation of meperidine toxic metabolites**.

This clinical scenario could include any reason for a patient to receive meperidine. Other drugs that may precipitate seizures in patients on hemodialysis when the drug dose is not adjusted: Beta-lactam antibiotics, metoclopramide, toxic levels of theophylline, lithium, acyclovir, and carbamazepine. Meperidine should be avoided in patients on hemodialysis.



SCRIPT

Patient with a history of major depression develops an injury requiring management of chronic pain.

The pain management specialist prescribes tramadol.

What is the problem with tramadol use in this patient?

The problem is **increased risk of suicide**.

In May, 2010, the FDA issued a boxed warning for tramadol because the drug has been associated with increased suicides in patients who are "addiction-prone" or require antidepressants. Use in these groups of patients is discouraged.

SCRIPT

Teen with known major depression and no other PMH, who was normal in the a.m., is found somnolent and obviously intoxicated by her parents at night. Other findings include:

- Nausea, vomiting
- ↑ Serum AST and ALT > 3,000
- Mild RUQ tenderness
- ↑ Blood alcohol level
- Normal anion gap and serum chemistry
- Normal PT and PTT

What is the most likely diagnosis?

Most likely diagnosis is **acetaminophen overdose**.

The major clue in this case is the very high serum transaminases. Have a very high index of suspicion for acetaminophen overdose in any depressed patient who presents with acute hepatitis. The acuity of the symptoms suggests that this presentation is not viral hepatitis or hepatobiliary disease (since patient was asymptomatic in the morning). You might have guessed "alcohol poisoning," but recognize that alcohol intoxication does not cause this dramatic of a rise in transaminases, so AST and ALT > 3,000 should make you think of toxins. Keep a lookout for very high liver enzymes—the patient may not tell you that acetaminophen was ingested!

Dx: Clinical suspicion + serum acetaminophen concentration at presentation and at 4 and 24 hours after ingestion.

Tx: Activated charcoal (if presents within 4 hours of ingestion) + n-acetylcysteine therapy based on serum acetaminophen level plotted on nomogram.



SCRIPT

Known asthmatic with h/o major depression presents with:

- Intractable vomiting
- Abdominal pain
- Tremulousness
- Sinus tachycardia
- ↓ Serum K
- Normal creatinine
- Normal AST, ALT, albumin, alkaline phosphatase, PT, and PTT

What is the diagnosis?

Diagnosis is **theophylline toxicity**.

This is a hard question because the only real clues are: History of asthma, intractable vomiting, and tremulousness. You might have guessed albuterol use, considering the asthma history, but the rest of the symptoms aren't explained. Same is true if you guessed cocaine or amphetamine use. When a question gives you past medical history, think about how it is relevant to the presenting signs and symptoms. You must know, and recognize, classic theophylline toxicity. Always have, "Maybe this is something related to theophylline ..." in the back of your mind when you encounter an asthmatic on an exam. Toxicity occurs either because of intentional overdose (as in this case) or chronic use of theophylline with an intercurrent illness or prescription of a drug that inhibits theophylline metabolism.

Dx: Clinical + theophylline level every 2 hours until peaks, then every 4 through 24 hours after ingestion + acetaminophen level (often is co-ingested in suicides) + ECG.

Tx: Decontamination if early + NS IVFs + electrolyte replacement + adenosine or beta-blockers for arrhythmias + benzos for seizures + dialysis when severe.

SCRIPT

Patient with bipolar disorder presents with:

- Nausea, vomiting, diarrhea
- Confusion and irritability
- Ataxia
- Tremors and myoclonic jerks

What is the most likely diagnosis?

Most likely diagnosis is **lithium poisoning**.

Even though the case doesn't tell you that the patient is on lithium, you can infer that the patient takes lithium based on the medical history of bipolar disorder and the classic symptoms of poisoning. Presentation depends on whether the poisoning is acute or chronic. Acute findings include: Nausea, vomiting, diarrhea, prolonged QT interval, somnolence, confusion, tremors, jerks, and seizures. Chronic lithium overdose can cause nephrogenic diabetes insipidus and hypernatremia as well as somnolence or confusion and a prolonged QT interval. Know that an acid-base disturbance does not occur as a result of lithium intoxication, so abnormality in the serum pH should cause you to consider some kind of co-ingestion; e.g., aspirin or an acid alcohol.

Dx of acute poisoning: Clinical + serum lithium level q 2–4 hours until peak level determined + electrolytes + BUN and creatinine + acetaminophen and salicylate levels (if suicide attempt) + ECG.

Tx: Respiratory support + bolus IVF if hypovolemic + water replacement if severely hypernatremic + hemodialysis.

Misc: Clinical symptoms often do not correlate with the lithium level. Treat based on clinical presentation, not level. Activated charcoal is ineffective, so do not use!

SCRIPT

Patient with h/o migraines, on prophylaxis presents with:

- Somnolence, confusion, and hallucinations $\pm$ seizures
- Flushing
- $\pm$ $\downarrow$ BP
- Mydriasis
- Widening of the QRS interval > 100 ms $\pm$ prolongation of the PR and QT intervals
- $\pm$ High anion gap metabolic acidosis

What is the diagnosis?

Diagnosis is **tricyclic antidepressant overdose**.

Recall that amitriptyline is a TCA often used for migraine prophylaxis. A clinical scenario could include history to suggest that the patient takes, or has access to, TCAs. Anticholinergic symptoms (flushing, hypotension, dilated pupils) and the prolonged QRS suggest TCA overdose. This is an important overdose to remember because these patients deteriorate rapidly and can die of cardiac arrhythmias. Think about TCAs when you see a wide QRS.

Dx: Clinical + ECG + acetaminophen and salicylate levels (if suicide attempt) + qualitative/quantitative urine/blood TCA levels (not used to assess whether overdose occurred, only whether patient has taken TCA).

Tx: Respiratory support + activated charcoal if presents within 2 hours of ingestion + IVF bolus if hypotensive + sodium bicarbonate if QRS > 100 ms or if arrhythmia present (1–2 mEq/kg IV push while observing continuous ECG; monitor arterial pH and do not exceed pH 7.55) + IV sodium bicarbonate drip if QRS narrows in response to IV push + norepinephrine for refractory hypotension + benzos for seizures.

Misc: Don't use antiarrhythmics. The sodium bicarbonate is treatment of choice.

SCRIPT

Middle-aged patient with h/o HTN, heart failure, and OA takes ramipril, furosemide, spironolactone, digoxin, and chronic use of naproxen. He presents with several weeks of:

- Weakness and fatigue
- Nausea, vomiting, and intermittent abdominal pain
- Disorientation
- Changes in color vision
- ↓ HR

What is the diagnosis?

Diagnosis is **digoxin overdose**.

Although changes in color vision are classic for digoxin intoxication, not all patients experience them. Chronic weakness and nausea/vomiting in any patient on digoxin indicate toxicity. Look in the history for reasons that a patient who has been previously stable on digoxin would develop toxicity; e.g., acute kidney injury from chronic NSAIDs or an acute illness causing volume depletion. Lots of rhythm disturbances can occur in dig. Toxicity, including PVCs and bigeminy, bradycardia, AV blocks, V. tach, and V. fib.

Dx: Clinical + serum digoxin level + electrolytes (watch serum K; hyperkalemia is predictor of mortality in acute ingestion, and hypokalemia predisposes to arrhythmias in chronic overdose) + BUN and creatinine + serial ECGs.

Tx: Respiratory support + Fab fragments if arrhythmia or hypotension present $\pm$ atropine for acute treatment of bradyarrhythmias. Hyperkalemia rapidly reverses with Fab fragments, so usually the high K does not require any other treatment, such as calcium and dialysis.

Misc: The digoxin level often does not correlate with toxicity. Treat based on clinical symptoms.

SCRIPT

Patient presents with:

- Agitation and paranoia
- Disheveled and malnourished appearance
- Poor dental hygiene and excessive caries
- Excoriations on the face and arms
- Diaphoresis
- ↑ HR
- ↑ BP
- Mydriasis

What is the diagnosis?

Diagnosis is **methamphetamine use**.

Autonomic stimulation can occur with many drugs of abuse, so look at the entire clinical history for clues to the type of drug. Excessive dental caries and skin excoriations are highly associated with chronic meth use. Users have decreased saliva and bruxism, which contribute to the poor dental hygiene. Bruxism also is common in the use of ecstasy and bath salts, but neither is not associated with the other findings presented in this case. Chronic use of methamphetamine often causes the sensation of ants crawling on the skin (called "crank bugs"), and users pick at their skin incessantly causing sores.



SCRIPT

Young patient presents with:

- Euphoric confusion
- Somnolent mentation
- Track marks on the upper extremities
- Miosis
- ↓ RR
- ↓ Bowel sounds
- Normal blood glucose

What is the diagnosis?

Diagnosis is **opiate overdose**.

You might have guessed alcohol intoxication, if you were guessing a general CNS depressant. Alcohol intoxication is not associated with the constriction of pupils or reduction in bowel sounds. Know that opioid intoxication is a clinical diagnosis because many of the urine drug screens are not sensitive enough to completely exclude use. The case could include that a very small dose of naloxone results in normalization of the respiratory rate, which is the best way to diagnose opiate intoxication. Although miosis is the classic finding in opiate intoxication, many patients have normal pupils because they co-ingest a sympathomimetic.

Dx: Clinical and of exclusion (especially exclude hypoglycemia, which presents similarly) + acetaminophen level (if suicide attempt) ± ECG (methadone can increase the QT interval). Urine drug screens are unreliable to detect opiates.

Tx: Supportive care + naloxone in small doses to restore ventilation (not awareness!—because you can precipitate withdrawal in the chronic user).



SCRIPT

Teen patient is brought to the ED from a party with the following:

- Confusion $\pm$ seizures
- $\uparrow$ BP
- $\uparrow$ HR
- $\uparrow$ RR
- Diaphoresis
- Bruxism
- $\downarrow$ Serum Na
- $\pm \uparrow$ Serum creatinine and CPK
- $\pm \uparrow$ PT, PTT, d-dimer, and fibrin degradation products with $\downarrow$ fibrinogen

What is the diagnosis?

Diagnosis is **ecstasy (MDMA) intoxication**.

The clinical scenario is a rare complication of ecstasy use but is more likely to be asked about in an exam situation because of the potential for death associated with this presentation. Usually the clinical history will give you a clue to the possible ingestion of ecstasy, such as attendance at an all-night dance party ("Rave") or dancing for a prolonged period with friends. These are the patients at highest risk for dehydration, sodium derangements, hyperthermia, rhabdomyolysis, and renal failure. Think about ecstasy in the healthy patient who acutely presents with rhabdo and hyponatremia.

Dx: Clinical and of exclusion (exclude acetaminophen co-ingestion with acetaminophen level + glucose + ECG) + electrolytes + CPK + BUN and creatinine + AST and ALT + coagulation studies (PT/INR, platelets, and d-dimer). No screening test is available to test for MDMA intoxication.

Tx: Respiratory support + benzos to treat the sympathomimetic symptoms (no haldol!) and seizures + careful IVF use (watch for development of hyponatremia and treat with 3% saline if neurologic impairment present).



SCRIPT

Otherwise healthy patient presents with:

- Acute onset of headache, nausea, and dizziness
- Mild confusion, no fevers or stiff neck
- Normal vital signs, pulse oximetry, serum chemistry, anion gap, osmolal gap, CBC, and urine drug screen

What is the diagnosis?

Diagnosis is **CO poisoning**.

Diagnosing CO poisoning can be tough. You might have guessed a simple viral prodrome. Dx would be more obvious if the case presented a comatose patient, but the exam won't always give you that. Consider CO poisoning when a patient who was normal suddenly becomes confused, obtunded, or comatose, with antecedent headache and GI symptoms, and a normal serum chemistry. The clinical scenario might include exposures to heating equipment or generators, or mention that the patient feels better when he goes outside. The PE might mention "cherry red lips," although this finding usually is not seen. An alternate diagnosis to consider in acute confusion/obtundation and normal labs is isopropyl alcohol ingestion, but the osmolar gap is increased in that situation.

Dx: Clinical + carboxyhemoglobin level.

Tx: High-flow oxygen via face mask or intubation and 100% oxygen if comatose $\pm$ hyperbaric oxygen.



SCRIPT

Healthy patient presents after working for hours in the yard with acute onset:

- Lacrimation and salivation
- Miosis
- Diaphoresis
- Diarrhea
- Vomiting
- Urination
- ↓ HR
- Fasciculations
- Motor weakness
- Bronchospasm

What is the diagnosis?

Diagnosis is **organophosphate poisoning**.

Look for classic features (DUMBELS: Defecation, urination, miosis, bronchospasm/bradycardia, emesis, lacrimation, salivation + fasciculations and weakness) and an exposure history to agricultural pesticides, especially malathion and Dursban®, which are agents commonly used to control yard pests. Remember that exposure can occur across the skin, so patients can become poisoned by handling fabrics covered in insecticide. Sometimes it takes days from exposure before signs of toxicity develop. Affected patients improve dramatically after a trial dose of atropine, so a question might include that clue. You might have guessed heroin withdrawal if you associate lacrimation and diarrhea with heroin. But remember that miosis usually occurs with heroin intoxication, not withdrawal. Patients in opiate withdrawal usually have dilated pupils.

Dx: Clinical ± empiric dose of atropine 1 mg (reverses symptoms).

Tx: Respiratory support (avoid succinylcholine!) + atropine injections titrated to clearance of respiratory secretions and improvement in bronchoconstriction + benzos for seizures.



SCRIPT

Previously healthy patient presents with the acute onset of:

- Myalgias
- Rhinorrhea
- Lacrimation
- Restlessness and yawning
- Abdominal pain
- Diarrhea
- Mydriasis
- Intact mentation

What is the diagnosis?

Diagnosis is **heroin withdrawal**.

The biggest clue to this withdrawal syndrome is yawning associated with restlessness and lacrimation. It is not often that you observe a teary patient who is yawning. Certainly, a restless patient often does not yawn. Remember opiate intoxication is associated with pupillary constriction, and withdrawal is associated with pupillary dilation.

Dx: Clinical.

Tx: Supportive + opioids (methadone 10–20 mg orally) or non-opioids (benzos), depending on ultimate goal of patient ± clonidine.



SCRIPT

Patient is admitted to the hospital for an acute condition and within 24 hours develops:

- Headache
- Agitation
- Nausea
- Tremulousness

This progresses over the next 24 hours to:

- Visual hallucinations and a seizure

What is the diagnosis?

Diagnosis is **alcohol withdrawal**.

The case could include autonomic instability and frank delirium (disturbed cognition and fluctuating consciousness). The signs and symptoms in this clinical scenario are the early manifestations of alcohol withdrawal in an addicted patient. Recognize that the question often does not include any history of preexisting heavy alcohol use because the objective is to determine whether you can recognize withdrawal without the inciting clinical history. This is not opiate withdrawal because of the lack of tearing, salivating, diarrhea, etc.

Dx: Clinical.

Tx: Supportive care + benzodiazepines (no haldol, clonidine, anticonvulsants, or ethanol, as all are associated with seizures) + IVF with thiamine + electrolyte replacement (especially potassium, phosphorus, and magnesium).



SCRIPT

Female patient older than 40 years, with h/o far-sightedness, presents with:

- An acutely painful eye that began while watching a movie in a theater
- Decreased vision in the eye
- Seeing "halos" around lights
- Conjunctival injection
- Poorly reactive pupil

What is the diagnosis?

Diagnosis is **acute angle-closure glaucoma**.

Remember that acute angle-closure glaucoma is an ocular emergency, and primary open-angle glaucoma is a more chronic condition that presents without redness and pain. An acute, painful red eye is always suspicious for angle-closure glaucoma, especially in those with a family history and personal history of farsightedness. The big clue is the onset of pain while at a theater; these patients often have the onset of disease while entering a dark area, or at night, because the pupil dilates in this situation and results in blockage of the narrow angle.

Dx: Clinical + slit lamp exam with exam of fundus, estimation of intraocular pressure, and visual fields testing.

Tx: Emergent referral to ophthalmologist.

SCRIPT

Patient with h/o myopia presents with:

- A large floater (or several floaters) in the field of vision that may or may not improve with time
- Intermittent short (< 1 second) flashes of light in the same eye that has the floaters
- Eventual loss of vision

What is the diagnosis?

Diagnosis is **retinal detachment**.

Floaters and flashing lights in a myopic patient is retinal detachment—always! (on an exam). You might have guessed migraine, but the scotoma associated with a migraine lasts 20 minutes or so, not less than 1 second, and usually is described as horizontal lines. Also, a case about migraine would include eventual onset of headache.

Dx: Clinical + visual acuity testing + visual fields.

Tx: Emergent referral to ophthalmologist for patients with vision loss or visual field impairment.



SCRIPT

60-year-old patient with h/o HTN, DM, and tobacco abuse presents with:

- Acute onset of painless, severe vision loss
- Funduscopic exam: Retinal whitening with a “cherry red spot”
- “Afferent pupillary defect”

What is the diagnosis?

Diagnosis is **retinal artery occlusion**.

The case could provide additional evidence as to the source of the embolism (e.g., previous TIA symptoms due to carotid stenosis). The case also could include a description of (or photos of) the embolus itself, describing it as a "cholesterol plaque," a "platelet plug," or evidence of calcification. "Afferent pupillary defect" means that both pupils dilate when light stimulates the affected eye. The defect occurs because the involved eye sees less light, so dilation occurs.

Dx: Clinical.

Tx: Emergent referral to ophthalmologist for attempt at revascularization to save vision.



SCRIPT

Caucasian woman between 20 and 40 years, from the northern U.S., develops a painful eye over hours to days associated with:

- Decreased central vision
- “Afferent pupillary defect”
- Normal funduscopic exam

What is the diagnosis?

Diagnosis is **optic neuritis**.

The normal funduscopy exam is a very important clue and occurs in most patients; that is, they have no obvious signs as to the cause on examination. 1/3 will have disk edema and blurring of disk margins with venous distention. Because optic neuritis often is associated with multiple sclerosis, the case may include evidence of other clinical CNS lesions, lesions on MRI, and the finding of oligoclonal bands in the CSF.

Dx: Clinical + funduscopy exam by ophthalmologist ± MRI (assesses for additional lesions)
± lumbar puncture.

Tx: Supportive ± systemic corticosteroids for those with severe vision loss or white matter lesions on MRI.



SCRIPT

Previously healthy patient presents with:

- Acute unilateral eye pain
- Photophobia
- Redness, maximal at the limbus (where cornea meets sclera)
- Poorly reactive pupil
- Fluorescein dye shows no foreign body or keratitis
- Pain in the Achilles tendon

What is the ocular diagnosis?

Diagnosis is **anterior uveitis**.

Recognize that "anterior uveitis" and "iritis" are the same entity. Anterior uveitis is associated with systemic disease ~ 40% of the time, e.g., spondyloarthropathies, inflammatory bowel disease, psoriasis, Behçet's, sarcoid. The case often will include relevant etiologic history; in this case, pain in the Achilles is a type of enthesopathy seen with spondyloarthropathies, such as ankylosing spondylitis. Hilar lymphadenopathy might be present to suggest sarcoid. Posterior uveitis does not present with pain and redness, rather, with floaters and vision loss. Viral keratitis also presents with maximum redness at the limbus, but the dendritic lesions show up on fluorescein stain. Conjunctivitis is only mildly painful. This could be acute angle-closure glaucoma but the pertinent history isn't present (older patient with farsightedness who enters a dark room); but indeed, the association is present in the history for uveitis (enthesopathy).

Dx: Clinical + slit lamp exam.

Tx: Assess for underlying diagnosis and treat the cause + topical steroids.

SCRIPT

Otherwise healthy patient presents with:

- Acute unilateral eye pain
- Redness, maximal at the limbus (where cornea meets sclera)
- Numbing of the cornea
- Watery ocular discharge
- ↓ Visual acuity
- Inflamed conjunctiva
- Fluorescein dye: Dendritic lesions

What is the diagnosis?

Diagnosis is **herpes keratitis**.

This condition is often asked about on exams to determine if you can tell the difference between redness and pain due to anterior uveitis from the redness and pain of viral keratitis. Distinguishing is very important because anterior uveitis is treated with topical steroids, but these same drops worsen keratitis. The buzzword for this condition is: "Dendritic" (describing the type of lesions seen with staining).

Dx: Clinical + slit lamp exam.

Tx: Emergent referral to ophthalmologist for suspicion; oral or topical antiviral drugs.



SCRIPT

Young patient who swims frequently presents in the summer time with:

- A sore throat
- Mildly inflamed conjunctiva
- Mild, purulent ocular discharge and pain
- Anterior cervical lymphadenopathy

What is the diagnosis?

Diagnosis is **adenovirus infection**.

This cute little infectious disease is easy to remember in association with summer and swimming pools. Outbreaks of adenovirus are common in these settings. It presents as pharyngitis and conjunctivitis.

Dx: Clinical ± swabs of exudate for viral culture and PCR testing.

Tx: Supportive ± topical lubricating drops; be aware that the symptoms may take up to 3 weeks to resolve.

SCRIPT

Healthy patient who wears contact lenses presents with:

- An acutely painful eye
- Redness
- Tearing
- Sensitivity to light
- She admits to reusing contact lens storage solution, wearing the lenses for months at a time without cleaning, and using tap water occasionally to clean the lenses.
- Fungal smears: Hyphae

What is the diagnosis?

Diagnosis is *Acanthamoeba keratoconjunctivitis*.

Be aware of two special entities that can cause aggressive keratitis in contact lens wearers who have poor lens hygiene: *Acanthamoeba* and *Fusarium* infections. Suspect in patients who reuse solution and use tap water for cleaning. Both organisms are seen on smears from the irritated conjunctiva and cornea. Good contact lens hygiene is important; wearers should never use tap water to clean lenses and should avoid wearing lenses while swimming.

Dx: Clinical + smears of conjunctiva/cornea.

Tx: Emergent referral to ophthalmologist for debridement and topical antimicrobials.

SCRIPT

Patient with a month-long h/o HA and purulent nasal discharge presents with:

- Fever
- Unilateral orbital swelling and erythema
- Double vision
- Deficits in extraocular movements

What is the diagnosis?

Diagnosis is **orbital cellulitis**.

The clue to this case is the history of untreated sinusitis—a risk factor for orbital cellulitis. The differential diagnosis for orbital swelling is orbital and preseptal cellulitis (and trauma, but trauma is missing from this history). Preseptal disease is not associated with evidence of deep muscle and fat involvement, which manifests as difficulty in moving the eye in all directions. You might have guessed “Pott’s puffy tumor” if you have a loose association between sinusitis and facial swelling. Pott’s puffy tumor is specific to the diagnosis of frontal bone osteomyelitis with a localized abscess as a result of frontal sinusitis, and it doesn’t affect extraocular movements. Organisms most responsible for orbital cellulitis are *S. aureus* and various strep species. With orbital cellulitis, worry that there is a concomitant subperiosteal abscess or orbital abscess, especially when proptosis is present.

Dx: Clinical + CT or MRI of the orbits and sinuses + blood cultures.

Tx: Empiric parenteral coverage for staph and strep; e.g., vancomycin + 1 of the following: Ceftriaxone, cefotaxime, amp-sulbactam, or pip-tazo + otolaryngology and ophthalmology referrals.

SCRIPT

Patient between 20 and 40 years of age presents with:

- Tinnitus
- Episodic vertigo that lasts from hours to a day with nausea and vomiting
- Audiology testing: Low-frequency hearing loss

What is the diagnosis?

Diagnosis is **Ménière disease**.

Ménière's is usually the diagnosis when you see a patient with vertigo associated with hearing loss. Severe cases can progress to complete unilateral hearing loss.

Dx: Clinical symptoms + sensorineural hearing loss.

Tx of acute events: Benzos ± antihistamines (meclizine) ± scopolamine ± antiemetics in suppository form for emesis.

Chronic Tx: Reduce intake of salt, caffeine, nicotine, and alcohol ± diuretics ± otolaryngologic surgical interventions for refractory cases.

SCRIPT

A patient in her 20s with FH schizophrenia presents with > 7 days of “insomnia” and the following:

- Grandiose short-term goals
- Extravagant and colorful dress
- Pressured, tangential speech
- Agitation and easy distractibility
- Flirtatious gestures and hypersexual speech

What is the diagnosis?

Diagnosis is **bipolar disorder**.

Excluding drug use is important before diagnosing a patient with any mental illness associated with mania or psychosis. That being said, patients with bipolar disorder have a very high rate of concomitant substance abuse. The clues in this case are easy to fit into a diagnosis of mania, indicative of bipolar disorder: Pressured speech, grandiose talk, hypersexuality, distractibility, and lack of need for sleep. Although this is a psychiatric diagnosis, these patients commonly present to emergency departments and primary care providers, so recognition of the presentation is frequently tested.

Dx: Clinical.

Acute Tx of Mania: Severe episodes are those characterized by psychosis or suicidal or homicidal ideation or judgment that puts the patient in immediate danger. These episodes should be treated with combination drugs under the advisement of a psychiatrist.

SCRIPT

Patient with known psychotic disorder is treated with increased doses of haloperidol, then develops the following within 2–3 days:

- Fever
- Increasing agitation and confusion, unabated by the antipsychotic
- Profuse diaphoresis
- Labile HR and BP
- Tremulousness and intense rigidity

What is the diagnosis?

Diagnosis is **neuroleptic malignant syndrome**.

Remember that NMS is idiosyncratic in that it can present after the first use of a neuroleptic or after several successful uses. Rigidity is key to the diagnosis. NMS is more common in younger males, and coadministration of lithium is a risk factor. You might have guessed serotonin syndrome, which presents similarly but with less rigidity and more clonus. So, NMS = rigidity; serotonin syndrome = myoclonus and hyperreflexia. (Remember, "myoclonus" is spontaneous muscle twitching and jerks, and "rigidity" is increased muscle tone.) Serotonin syndrome also presents with shivering, nausea/vomiting/diarrhea, and ataxia and develops rapidly (within hours), while NMS usually evolves over 1–3 days. If the patient had exposure to succinylcholine, this could be malignant hyperthermia. You might also have guessed ecstasy or cocaine use. While these recreational drugs can cause hyperthermia, rigidity is not a feature of excessive use, and usually the case will include something to suggest ecstasy; e.g., dance party.

Dx: Clinical and of exclusion (CT or MRI + lumbar puncture to exclude other diseases).

Tx: Discontinue causative drug + supportive care; be on alert for complications: Rhabdo, arrhythmias, AMI, respiratory failure, DVT, DIC, seizures, and liver failure ± dantrolene for hyperthermia ± bromocriptine for psychosis.



SCRIPT

Patient with h/o major depression and chronic pains presents with:

- Fever
- Agitation ± confusion with excessive startle reflex
- Tremulousness
- Nausea, vomiting, and diarrhea
- ↑ HR
- Hyperreflexia and myoclonus

What is the diagnosis?

Diagnosis is **serotonin syndrome**.

The history of major depression clues you into the possible use of an SSRI or SNRI. In addition to SSRIs and SNRIs, be aware of opioids, antipsychotics, and stimulants as potential causative agents. Most patients who develop serotonin syndrome are on more than one drug that can affect serotonin. Myoclonus and hyperreflexia with an SSRI is a big clue to the diagnosis. The presentation seems similar to neuroleptic malignant syndrome, but NMS is characterized by slowness of muscles and reflexes manifesting as rigidity, not clonus. Anticholinergic toxicity has some of the features of serotonin syndrome but without the increase in muscular tone and reflexes. You might have guessed "thyroid storm," and that would be perfectly appropriate but the h/o depression does not fit with the typical illness script for thyroid storm. Also, for thyroid storm, the scenario likely would include evidence of previous undiagnosed hyperthyroidism.

Dx: Clinical and of exclusion (CT or MRI + lumbar puncture to exclude other diseases).

Tx: Discontinue causative drug(s) + supportive care + benzos ± cyproheptadine (serotonin antagonists). Do not use dantrolene or bromocriptine.



Hematology

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SCRIPT

Patient presents with:

- Overwhelming infection that may require intubation/pressor support
- $\uparrow$ or $\downarrow$ WBC; $\downarrow$ Plt
- $\pm \uparrow$ Serum AST, ALT, and creatinine
- $\uparrow$ PT and PTT
- Peripheral smear: Schistocytes
- $\uparrow$ D-dimer and fibrin degradation products, $\downarrow$ fibrinogen

What is the cause of the coagulopathy?

The cause of the coagulopathy is **disseminated intravascular coagulation**.

DIC is hard to differentiate from TTP sometimes, depending on the clinical presentation. In DIC, tissue trauma incites massive activation of the clotting cascade (prolongs PT and PTT), and platelets are consumed in the process of microthrombi formation. In TTP, however, coagulation studies are normal because the problem is a deficiency in ADAMTS13, which is a protease that normally cleaves von Willebrand's multimers. The persistence of these multimers leads to widespread platelet aggregation that is not mediated by the coagulation cascade (hence, normal PT and PTT).

Dx: Clinical + platelet count (low) + schistocytes on peripheral smear + fibrinogen (decreased) + fibrin degradation products (decreased) + D-dimer (increased).

Tx: Treat the underlying disease process + red cell and platelet transfusions if bleeding.

SCRIPT

Patient is hospitalized and given a broad-spectrum antibiotic for treatment of an infection. He then develops:

- Epistaxis and large ecchymoses at injection sites
- Normal CBC
- Peripheral smear: No abnormalities
- Prolonged PT but normal PTT
- Normal AST and ALT
- Normal or slightly reduced albumin

What is the cause of the coagulopathy? What is this due to?

The cause of the coagulopathy is **vitamin K deficiency** due to **broad-spectrum antibiotic use**. Remember that the PT reflects coagulation factors: II, VII, IX, and X, which are produced in the liver. These are the vitamin K–dependent factors. The normal albumin tells you that the liver is not diseased. Broad-spectrum antibiotics eradicate the vitamin K–producing organisms from the intestine and lead to deficiency.

Dx: Clinical + PT (prolonged) + platelets (normal).

Tx: Support and discontinuation of antibiotic or change to an antibiotic with a more narrow spectrum of activity + vitamin K replacement.

SCRIPT

Patient presents with:

- Fatigue
- ↓ Hgb and Hct with ↓ MCV and MCHC
- ↓ Reticulocyte count
- ↓ Serum Fe, ↑ TIBC, $\text{Fe/TIBC} < 20\%$, ↓ ferritin, ↑ soluble transferrin receptor concentration

What is the diagnosis?

Diagnosis is **iron deficiency anemia**.

Dx: Iron studies (serum Fe, TIBC, ferritin, Fe/TIBC) $\pm$ soluble transferrin receptor assay.

Tx: Oral iron replacement + determine reason for IDA with good ROS and targeted laboratory testing/imaging.

SCRIPT

Patient presents with:

- Fatigue
- Recurrent abdominal pain
- Voluminous stools
- Pruritic, vesicular rash on the extremities and thorax
- ↓ Hgb and Hct, ↓ MCV and MCHC
- ↓ Reticulocyte count
- ↓ Serum Fe, ↑ TIBC, $\text{Fe/TIBC} < 20\%$, ↓ ferritin, ↑ soluble transferrin receptor concentration

What is the diagnosis? What is the name of the rash?

Diagnosis is **celiac disease**. The rash is **dermatitis herpetiformis**.

Celiac disease is associated with autoimmune hypothyroidism, osteoporosis and osteopenia, Type 2 diabetes, selective IgA deficiency, and a nonspecific increase in liver transaminases.

Dx: Clinical + serum antiendomysial antibody $\pm$ IgA anti-tissue transglutaminase antibody $\pm$ duodenal biopsy when +antibody (all performed while on gluten-rich diet).

Tx: Gluten-free diet.



SCRIPT

Young patient with h/o a substance abuse presents with:

- Confusion after using inhalants
- $\uparrow$ HR
- Pulse oximetry $> 92\%$
- Blood: Unusual chocolate-brown discoloration
- $P_aO_2 > 70$

What is the diagnosis? What is this due to?

Diagnosis is **acquired methemoglobinemia** due to **inhalation of nitrites**.

Remember the association between inhalation of amyl nitrite (slang terms = "poppers," "rush," "jungle juice") and methemoglobinemia. Dapsone and local anesthetics also are associated with acquired methemoglobinemia.

Dx: Clinical (high suspicion if cyanotic and normal oxygenation) + arterial methemoglobin concentration.

Tx: Varies depending on etiology and concentration; for acquired cases with > 20% methemoglobin concentration, give methylene blue $\pm$ transfusion.

SCRIPT

Middle-age patient with h/o Type 2 DM and calcium pyrophosphate deposition in a wrist c/o:

- Fatigue
- Arthralgias
- Vague abdominal pain
- Diffuse skin hyperpigmentation
- Normal CBC
- ↑ Serum Fe, normal TIBC, transferrin saturation > 45%, ↑ ferritin

What is the diagnosis?

Diagnosis is **hereditary hemochromatosis**.

Remember the triad of diabetes, cirrhosis, and skin bronzing. Associated conditions include CPPD arthropathy, hypogonadism, heart disease, and destructive arthritis.

Dx: Clinical + serum Fe/TIBC (> 45%) + ferritin (increased) ± liver biopsy.

Tx: Phlebotomy.

SCRIPT

Middle-age patient presents with:

- Weight loss, night sweats, episodic fevers, and lymphadenopathy
- $\pm$ Palpable spleen
- $\downarrow$ Hgb and Plt
- Peripheral smear: $\downarrow$ Red cells and Plt without clumping
- Normal serum iron studies
- $\uparrow$ T. bili, I. bili, and LDH
- Negative HIV and hepatitis panel
- Positive Coombs test
- TB skin testing: Non-reactive

What is the cause of the anemia? What is it due to?

The cause of the anemia is **autoimmune hemolysis and thrombocytopenia** due to **underlying leukemia/lymphoma**.

The presence of the autoimmune hemolytic anemia, in conjunction with lymphadenopathy and B symptoms, suggests lymphoma, and you should remember that lymphomas can make antibodies against blood cells. Remember that you do not order an antiplatelet antibody to make the diagnosis of secondary autoimmune thrombocytopenia because the test is too nonspecific.

Dx of autoimmune hemolysis: Clinical + Hgb (low) + evidence of hemolysis (increased indirect hyperbilirubinemia, reticulocyte count, and LDH; decreased haptoglobin) + Coombs+; do not order the antiplatelet antibody test.

Tx: Treat the underlying disease.

SCRIPT

Postpartum woman presents with:

- Confusion, headache, fever, $\pm$ seizures
- $\downarrow$ Hgb and Plt
- $\uparrow$ Serum creatinine
- $\uparrow$ T. bili and I. bili, $\uparrow$ LDH, $\downarrow$ haptoglobin
- Peripheral smear: Schistocytes
- Negative Coombs test
- Normal U/A
- Normal PT and PTT

What is the diagnosis?

Diagnosis is **thrombotic thrombocytopenia purpura**.

This diagnosis is caused by ADAMTS13 deficiency. Recognize the classic features: Fever, anemia (microangiopathic hemolytic), renal failure, thrombocytopenia, and CNS disease (rare that all 5 manifestations are present in the clinical setting). Also recognize that the clinical scenario could include a pregnant woman, a history of autoimmune disease (especially lupus), metastatic cancer (especially adenocarcinomas), certain chemotherapy agents, post-stem cell transplant, or no symptoms (healthy patient). The presentation is similar to malignant hypertension and scleroderma renal crisis, but in TTP, hypertension is not a feature.

Dx: Clinical + Required features: Thrombocytopenia and microangiopathic hemolytic anemia (schistocytes) + PT/PTT (normal).

Tx: Immediate plasma exchange transfusion.

SCRIPT

Patient is readmitted to the hospital with:

- Deep venous thrombosis after a recent brief hospital stay that included the prescription of heparin
- Normal platelet count

What is the diagnosis?

Diagnosis is **heparin-induced thrombocytopenia**.

Clinical scenario could present an in-house patient who develops thrombocytopenia while on heparin. Highest risk of clots, however, is after the thrombocytopenia resolves, usually after the heparin has been discontinued. Recognize that platelets can be in the normal range, if the patient had a thrombocytosis at the initiation of heparin.

Dx: Clinical (prediction models, such as the 4 Ts, are helpful) $\pm$ serotonin release assay (positive) or solid phase immunoassay (negative test excludes).

Tx: Stop heparins + lepirudin (do not use in patients with low GFR), bivalirudin, argatroban, or fondaparinux + warfarin (after platelets rise to $> 150,000$) and overlap with alternative anticoagulation x 5 days.

SCRIPT

Patient with h/o leg cramps, for which she takes an unknown over-the-counter medication, presents with:

- Petechiae
- Marked ↓ platelets
- Peripheral smear: Decreased platelets, no schistocytes
- Normal PT and PTT
- Negative HIV and HCV

What is the diagnosis?

Diagnosis is **quinine-associated thrombocytopenia**.

Quinine is associated with TTP, but this case is not TTP because no schistocytes are visible on the smear. Quinine can be bought OTC in products marketed for "leg cramps" and is also found in some tonic waters and in herbal preparations containing cinchona tree bark.

Dx: Clinical + platelet count (low).

Tx: Discontinue the offending agent.

SCRIPT

Young female with no h/o bleeding or bruising presents with:

- Menorrhagia
- Epistaxis
- Normal CBC
- ↑ Bleeding time and PTT; normal PT
- ↓ Factor VIII level

What is the diagnosis?

Diagnosis is **von Willebrand disease**.

Remember the difference in the presentation of von Willebrand disease (mucosal bleeding) compared to clotting factor deficiencies (joint bleeds), except in severe vWB disease, which can mimic a factor deficiency. This is a very complex illness, divided into 3 types with 4 subtypes. Even hematologists have a difficult time in interpreting the laboratory results. Know how the disease presents and what screening tests to order.

Dx: Clinical suspicion + Factor VIII (low) + vWF:Ag (total vWF protein; decreased) + vWF:RCoF (ristocetin-induced agglutination of normal platelets; decreased) + RIPA (ristocetin-induced agglutination of patient's platelets; decreased).

Tx: Depends on the form of vWD; mainstay is DDAVP® (desmopressin).

SCRIPT

Adolescent patient presents with:

- Recurrent epistaxis, menorrhagia, gum bleeding, and subjective excessive bleeding for minor cuts
- FH of same
- No NSAID use
- Normal Hgb, ↓ platelets
- Normal PT and PTT
- Prolonged bleeding time
- Normal Factor VIII levels
- Peripheral smear: Giant platelets

What is the diagnosis?

Diagnosis is **Bernard-Soulier syndrome**.

Thrombocytopenia, giant platelets on the smear, and the prolonged bleeding time are the clues to Bernard-Soulier, also termed "giant platelet syndrome." The defect is absence of the GPIb-IX-V receptor. This isn't von Willebrand's because the labs aren't right for that diagnosis (Factor VIII and bleeding time are prolonged, and no giant platelets are seen).

Dx: Rare syndrome that is difficult to distinguish among other genetic platelet disorders (gray platelet syndrome, May-Hegglin anomaly, and some types of vWD); diagnosis is within the realm of the hematologic subspecialist.

Tx: Platelet transfusions prn.

SCRIPT

Adolescent patient presents with:

- Recurrent epistaxis, menorrhagia, gum bleeding, and subjective excessive bleeding for minor cuts
- FH of same
- No NSAID use
- Normal CBC
- Normal PT and PTT
- Prolonged bleeding time
- Normal Factor VIII level
- Peripheral smear: No abnormalities
- Normal ristocetin cofactor activity

What is the diagnosis?

Diagnosis is **Glanzmann thrombasthenia**.

This entity is differentiated from Bernard-Soulier by the normal platelet count and the absence of giant platelets on the smear. It is differentiated from von Willebrand's by the ristocetin cofactor assay and the normal Factor VIII level. It is an autosomal recessive defect in a platelet integrin ($\alpha\text{IIb}\beta\text{3}$; previously termed "glycoprotein IIb/IIIa").

Dx: Disease is very rare, and diagnosis is within the realm of the hematologic subspecialist; abnormal platelet aggregometry.

Tx: Platelet transfusion $\pm$ stem cell transplant.

SCRIPT

Healthy patient undergoes pre-op assessment for elective surgery.

- No h/o bleeding or bruising
- No h/o heparin exposures
- Normal CBC
- Normal PT
- Prolonged PTT that corrects with 1:1 mix with normal plasma
- Normal bleeding time

What is the cause of the coagulopathy?

The cause of the prolonged PTT is **Factor XII deficiency**.

Factor XII deficiency is what you think about when you see a prolonged PTT without any history or clinical evidence of bleeding. It is not associated with a clinical bleeding disorder. The correction with the 1:1 mix tells you that an inhibitor is not the cause (an inhibitor would not correct with the mix).

Dx: Clinical + PT/PTT + 1:1 mix with normal plasma (corrects).

Tx: No treatment indicated.



SCRIPT

Young healthy patient presents with abdominal pain due to gallstones has the following:

- Splenomegaly
- Mildly ↓ Hgb and Hct, ↑ MCHC and RDW
- ↑ Reticulocyte count 5–20%
- Mildly ↑ I. bili
- Peripheral smear: Spherocytes

What is the diagnosis?

Diagnosis is **hereditary spherocytosis**.

This one is easy because spherocytes are seen on the peripheral smear.

Dx: Clinical (including FH of hemolytic anemia) + spherocytes on peripheral smear + osmotic fragility test (abnormal).

Tx: Folate + supportive red cell transfusions (rarely needed) ± splenectomy.



SCRIPT

Middle-age patient presents with:

- Chronic fatigue
- Vague, episodic, abdominal pain that occurs simultaneously with development of dark urine and worsening of fatigue
- ↓ Hgb and Hct
- Reticulocyte count > 10%,
- ↑ I. bili and LDH, ↓ haptoglobin
- U/A: Hemoglobinuria
- Flow cytometry: Distinct population of cells that are CD59 and CD55

What is the diagnosis?

Diagnosis is **paroxysmal nocturnal hemoglobinuria**.

Remember the classic association between acute hemolytic episodes, abdominal pain, and hemoglobinuria in PNH. PNH is associated with DIC and venous thrombosis, especially Budd-Chiari syndrome. PNH also may develop into aplastic anemia or myelodysplasia.

Dx: Clinical + flow cytometry (CD59– and CD55– cells).

Tx: Supportive + eculizumab (anti-CD5 monoclonal antibody that ceases hemolysis by inhibiting complement) ± prednisone.

SCRIPT

Young patient presents with:

- Community-acquired pneumonia
- Scleral icterus
- ↓ Hgb and RBC clumping
- ↑ Reticulocyte count
- Slight ↑ I. bili and LDH, ↓ haptoglobin
- Positive Coombs test
- Cold agglutinins > 1:64

What is the cause of the anemia? What is it due to?

The cause of the anemia is **autoimmune hemolysis** due to ***Mycoplasma* infection**. Remember the classic association between cold autoimmune hemolytic anemia and *Mycoplasma* and EBV infections.

Dx of autoimmune hemolysis: Clinical + Hgb (low) + evidence of hemolysis (increased indirect hyperbilirubinemia, reticulocyte count, and LDH; decreased haptoglobin) + Coombs+.

Tx: Supportive (+ treat underlying *Mycoplasma* infection).

SCRIPT

Older patient presents with:

- Lymphadenopathy, weight loss, night sweats, and anemia
- Scleral icterus and large mobile lymph nodes in the axillae and groin
- ↓ Hgb and RBC clumping
- ↑ Reticulocyte count
- Slight ↑ I. bili, ↑ LDH, ↓ haptoglobin
- Positive Coombs test

What is the cause of the anemia? What is it due to?

The cause of the anemia is **autoimmune hemolysis** due to **lymphoma**.

Remember the classic association between autoimmune hemolytic anemia and lymphoma and CLL.

Dx of autoimmune hemolysis: Clinical + Hgb (low) + evidence of hemolysis (increased indirect hyperbilirubinemia, reticulocyte count, and LDH; decreased haptoglobin) + Coombs+.

Tx: Treat the underlying disease.

SCRIPT

Vegan patient presents with:

- Nonspecific weakness
- Normal exam
- Normal WBC and platelets
- Mildly ↓ Hgb and Hct, normal MCV
- Hypersegmented neutrophils
- Serum B₁₂ : 300 pg/mL (within normal range)
- ↑ MMA and homocysteine levels

What is the diagnosis?

Diagnosis is **B₁₂ deficiency due to vegan diet**.

Remember that not all cases of B₁₂ deficiency are associated with anemia, and subclinical deficiency may have low-to-normal B₁₂ values. The clues in this case are: the history of veganism, the hypersegmented neutrophils, and the increased MMA and homocysteine levels. Severe cases may be associated with pancytopenia.

Dx: Clinical + B₁₂ + MMA (increased) + homocysteine (increased) ± measurement of anti-intrinsic factor antibodies (increased in pernicious anemia).

Tx: B₁₂ injections.

SCRIPT

Healthy male develops community- acquired pneumonia and is given a beta-lactam antibiotic. After 1 week, he develops:

- Fatigue
- Jaundice
- Dark urine
- ↓ Hgb
- ↑ Reticulocyte count
- Peripheral smear: Red cell fragments, bite cells, and Heinz bodies
- Negative Coombs test

What is the most likely diagnosis? What is the etiology?

Most likely diagnosis is **acute hemolysis** due to **G6PD deficiency**.

The history of infection prior to development of acute hemolysis is important, and together with characteristic "bite cells," should suggest the diagnosis. The negative Coombs test makes infection-associated autoimmune hemolytic anemia unlikely.

Dx: Clinical + measurement of serum glucose-6-phosphate dehydrogenase 3 months after the acute hemolytic event (to prevent false-negative test result).

Tx: Specific treatment depends on type and extent of disease; all patients should avoid certain drugs that trigger hemolysis (e.g., dapsone, nitrofurantoin, primaquine, sulfa drugs, rasburicase) and eating fava beans.

SCRIPT

Adult patient with SS sickle cell anemia presents with:

- Fever
- Weakness
- Hand arthralgias
- Erythematous reticular rash on the trunk and arms
- ↓ Hgb
- Reticulocyte count < 1%

What is the diagnosis? What is the most likely cause?

Diagnosis is **transient aplastic crisis** due to **parvovirus B19 infection**.

Patients with high red cell turnover, such as those with chronic hemolytic states (e.g., sickle cell, thalassemias) can become infected and develop a transient aplastic crisis that quickly self-resolves.

Dx: Clinical + undetectable reticulocyte count + decrease in Hgb + quantitative measurement of parvo B19 DNA in the serum $\pm$ detection of parvo B19 IgM (measurable in patients with hemolytic states).

Tx: Supportive red cell transfusions.

SCRIPT

Adult patient with SC sickle cell anemia presents with:

- Fever
- Abdominal pain
- Massive, tender splenomegaly
- ↓ Hgb
- ↑ Reticulocyte count

What is the diagnosis?

Diagnosis is **acute splenic sequestration**.

Note that patients with SS sickle cell anemia auto-infarct their spleens in infancy, so they are not at risk for this presentation as adults. Patients with the milder SC disease, however, are at risk.

Dx: Clinical + reticulocytosis.

Tx: Red cell transfusion + splenectomy.

SCRIPT

Healthy patient presents with:

- Long-standing h/o "iron-deficiency anemia" on iron replacement
- Mild ↓ Hgb and MCV < 65
- Normal reticulocyte count, serum Fe, TIBC, ferritin, I. bili, haptoglobin, and LDH
- Normal hemoglobin electrophoresis
- CBC from many years ago prior to iron supplementation: Similar results

What is the diagnosis?

Diagnosis is **alpha-thalassemia**.

Patients with this disorder who are given iron replacement are at risk for secondary hemochromatosis. Both alpha- and beta-thal are associated with microcytic anemias, but beta-thal is the one with the abnormal hemoglobin electrophoresis (increased A₂ component).

Dx: Clinical and of exclusion (exclude iron deficiency anemia) + Hgb electrophoresis (normal).

Tx: None required; discontinue iron supplementation if appropriate.

SCRIPT

Healthy patient presents with:

- Mildly ↓ Hgb and MCV < 65
- Normal reticulocyte count, serum Fe, TIBC, ferritin, I. bili, haptoglobin, and LDH
- Hemoglobin electrophoresis shows increased HbA₂

What is the diagnosis?

Diagnosis is **beta-thalassemia minor**.

Both alpha- and beta-thal are associated with microcytic anemias, but beta-thal is the one with the abnormal hemoglobin electrophoresis (increased A_2 component).

Dx: Clinical and of exclusion (exclude iron deficiency anemia) + Hgb electrophoresis (increased HbA_2).

Tx: None required; discontinue iron supplementation if appropriate.

SCRIPT

Patient on trimethoprim/sulfamethoxazole for a sinus infection presents for follow-up:

- Fatigue
- ↓ WBC, Hgb, Hct, Plt with normal MCV
- ↓ Reticulocyte count
- Peripheral smear: Normal cell maturation but ↓ cell numbers
- Bone marrow biopsy: Hypocellular marrow

What is the diagnosis? What is it caused by?

Diagnosis is **aplastic anemia** caused by **sulfa drug**.

If the patient were not taking TMP/SMX, a drug notoriously associated with aplastic anemia, the differential diagnosis would reasonably include myelodysplasia, myelofibrosis, PNH, and aplastic anemia due to viruses, such as HBV. Other drugs that can cause aplastic anemia include valproic acid, phenytoin, NSAIDs, chloramphenicol, carbamazepine, and nifedipine.

Dx: Clinical (usually marrow biopsy is not performed).

Tx: Discontinuation of marrow-suppressing drug.



SCRIPT

Patient with rheumatoid arthritis has:

- ↓ Hgb and Hct, normal MCV and MCHC
- ↓ Reticulocyte count
- ↓ Serum Fe, ↓ TIBC, normal Fe/TIBC, ↑ ferritin, normal soluble transferrin receptor
- Normal WBC, Plt, I. bili, haptoglobin, and LDH

What is the cause of the anemia?

The cause of the anemia is **inflammation (sometimes called “anemia of chronic disease”)**. Note that this anemia can occur with any chronic disease, such as rheumatoid conditions, chronic infections, and cancers.

Dx: Iron studies (serum Fe, TIBC, ferritin, Fe/TIBC) $\pm$ soluble transferrin receptor assay.

Tx: Treat underlying condition.

SCRIPT

Patient with HIV/AIDS and low CD4 count presents with:

- Fatigue, malaise, $\pm$ fever, and pallor on exam
- $\downarrow$ Hgb and Hct, normal MCV and MCHC
- $\downarrow$ Reticulocyte count
- Normal serum Fe and ferritin
- Normal WBC, Plt, I. bili, haptoglobin, and LDH
- Marrow aspirate: Scattered giant pronormoblast

What is the diagnosis? What is it caused by?

Diagnosis is **pure red cell aplasia** caused by **chronic parvovirus B19 infection**.

Patients with AIDS can become infected with parvo B19 and develop chronic infections and anemia. Giant pronormoblasts in the marrow indicate this infection. Patients with high red cell turnover, such as those with chronic hemolytic states (e.g., sickle cell, thalassemias) can become infected and develop a transient aplastic crisis that quickly self-resolves.

Dx: Clinical + undetectable reticulocyte count + decrease in Hgb + quantitative measurement of parvo B19 DNA in the serum ± detection of parvo B19 IgM (measurable in patients with hemolytic states; not usually present in HIV/AIDS cases).

Tx: Supportive red cell transfusions in all + in HIV/AIDS: Start antiretroviral treatment to reconstitute the CD4 cells ± IVIG if refractory.

SCRIPT

Patient develops:

- Fever and chills during a transfusion of packed red cells
- ↑ LDH and I. Bili
- ↓ Haptoglobin
- Positive Coombs test

What is the diagnosis? What is the most likely cause?

Diagnosis is **acute hemolytic transfusion reaction**. The most likely cause is **ABO incompatibility**. Anytime a patient has fever during a transfusion, this should be your first consideration.

Dx: Clinical + evidence of hemolysis (increased LDH and indirect hyperbilirubinemia + low haptoglobin and positive Coombs test) + blood bank evaluation of pre- and post-transfusion samples with repeat cross-matching.

Tx: Stop transfusion immediately + IVF support + furosemide-induced diuresis + monitoring for DIC (PT/PTT, fibrinogen, fibrin degradation products, and D-dimer).



SCRIPT

Patient presents with:

- Fever and chills during a transfusion of packed red cells
- Normal LDH, T. bili, and I. bili
- Negative Coombs test
- Normal haptoglobin
- Negative urine free hemoglobin

What is the diagnosis?

Diagnosis is **febrile non-hemolytic transfusion reaction**.

This is not an acute hemolytic transfusion reaction because the lab tests do not indicate hemolysis.

Dx: Clinical; exclude other causes of fever and exclude hemolysis.

Tx: Antipyretic ± meperidine for rigors.

SCRIPT

Pregnant woman with a FH of deep venous thrombosis presents with:

- Acute DVT

She is most likely to have one of two common inherited thrombophilias. What are the two?

The two thrombophilias are **activated protein C resistance** and **prothrombin gene mutation**. APC resistance is the disease caused by *Factor V Leiden* mutation. The *G20210A* mutation is the mutation in the prothrombin gene.

Dx: Clinical suspicion + functional assay + gene testing.

Tx: Anticoagulation.

SCRIPT

Female patient with h/o multiple spontaneous abortions presents with:

- An acute deep venous thrombosis
- Holosystolic murmur at the apex
- Violaceous, reticular rash on the thighs and arms
- ↓ Platelets
- Normal PT and prolonged PTT that does not correct with 1:1 mix with normal plasma
- + Serum VDRL

What is the diagnosis?

Diagnosis is **antiphospholipid antibody syndrome**.

The PTT in APA syndrome is sometimes considered “paradoxically prolonged” because the disease causes venous thrombosis, not bleeding.

Dx: Use clinical classification criteria (needs 1 clinical criterion [thrombosis or pregnancy morbidity] + 1 laboratory criterion [anticardiolipin antibody, anti- β 2-glycoprotein I antibody, or lupus anticoagulant]).

Tx: Acute DVT is treated with a heparin product followed by indefinite lifetime anticoagulation with warfarin.

SCRIPT

Patient is hospitalized and given prolonged cefotetan for an infection then develops:

- Epistaxis and large ecchymoses at injection sites
- Normal CBC
- Peripheral smear: No abnormalities
- Prolonged PT but normal PTT

What is the cause of the coagulopathy?

The cause of the coagulopathy is **antagonism of vitamin K by the N-methylthiotetrazole (NMTT) side chain on the cefotetan antibiotic**.

Remember the common cephalosporins that are associated with antagonism of vitamin K (cefazolin, cefoperazone, and cefotetan). These can result in clinical bleeding.

Dx: Clinical + PT (prolonged) + platelets (normal)

Tx: Support and discontinuation of antibiotic + vitamin K replacement.

SCRIPT

Elderly patient who has never had a bleeding problem presents with:

- Recurrent epistaxis, hematuria, and large ecchymoses that develop without history of trauma
- Normal CBC
- Peripheral smear: No abnormalities
- Normal bleeding time
- Normal PT but prolonged PTT that does not correct with 1:1 mix with normal plasma after 60 minutes

What is the diagnosis?

Diagnosis is **Factor VIII inhibitor**.

The bleeding and the prolonged PTT suggest a factor deficiency. The failure of the PTT to correct with the mixing study tells you that an inhibitor is present. You might have been thinking this was antiphospholipid antibody syndrome, and is associated with prolongation of PTT and does not correct with the mixing study. But, remember that APA is associated with clotting, not bleeding. This is not von Willebrand's because the bleeding time is normal, and the mixing study does not correct (it does correct in vWF when Factor VIII is replaced). Remember conditions associated with development of Factor VIII inhibitors: Age > 50 years, pregnancy, RA, SLE, and underlying malignancy.

Dx: Clinical + PTT (prolonged) + 1:1 mix (fails to correct).

Tx: DDAVP® (desmopressin) ± Factor VIII concentrate for severe bleeds + immunomodulation to remove the inhibitor (systemic corticosteroids, steroids + cyclophosphamide, steroids + rituximab, or IVIG).

SCRIPT

Patient on chronic iron supplementation for years because of a microcytic anemia presents with:

- New-onset diabetes
- Normal WBC and platelets
- Mildly ↓ Hgb with MCV < 65
- Normal reticulocyte count and hemoglobin electrophoresis
- Normal serum Fe, ↑ Fe/TIBC, ↑ ferritin

What is the diagnosis?

Diagnosis is **secondary hemochromatosis**.

The chronic mild anemia and low MCV is concerning for iron deficiency; yet, iron studies do not reveal iron deficiency. Thalassemias cause mild anemias with a low MCV and are often misdiagnosed as iron deficiency. A normal Hgb electrophoresis in the setting of a microcytic anemia and the exclusion of iron deficiency allows you to diagnose alpha thalassemia. Giving the patients iron long-term, results in an iron overload state. You cannot diagnose hemochromatosis in someone who takes exogenous iron.

Dx: Clinical + diagnosis of thalassemia + normal iron studies + increased ferritin.

Tx: Discontinue iron supplements.

SCRIPT

Patient with selective IgA deficiency is given a transfusion of packed red cells because of symptomatic anemia.

During the transfusion, she develops:

- Shortness of breath
- Wheezing
- Hypotension

What is the diagnosis?

Diagnosis is **anaphylaxis to blood products**.

Patients with selective IgA deficiency can develop anti-IgA antibodies. When given blood products containing IgA, anaphylaxis can result. Definitely remember that anaphylaxis is a possibility if IgA-deficient patients are given routine blood products.

Dx: Clinical.

Tx: Stop the transfusion immediately + IVF + epinephrine ± glucocorticoids.

SCRIPT

Patient presents with weeks of:

- Fatigue, gingival bleeding, and epistaxis
- Pallor
- Normal CBC
- Peripheral smear: Blasts with red rod-like structures in the cytoplasm

What is the diagnosis?

Diagnosis is **acute myelogenous leukemia**.

AML is the one acute leukemia that has the identifying Auer rod (red rod-like structures) in peripheral blood blasts; hence, a diagnosis can be made looking at the peripheral smear (and the rods are commonly asked about on Board exams). Leukocyte counts could be normal, low, or high. Acute leukemias are marked by **maturation arrest**; that is, there is an excess of one type of cell (the myelo- or lymphoblast). Chronic leukemias have an excess of cells in various **stages** of development (not maturation arrest), but blasts are not present in isolated excess. In a question about AML, the history could include exposure to benzene or other chemicals, a previous history of PNH, myelodysplasia, or one of the myeloproliferative disorders (P. vera, essential thrombocytosis, or CML).

Dx: Bone marrow infiltration with > 20% blasts or peripheral smear with > 20% blasts; blasts must be of myeloid lineage with Auer rods, myeloperoxidase+, or show myeloid markers on flow cytometry.

Tx: Depends on age and type of AML.

SCRIPT

Patient presents complaining of weeks of:

- Fatigue, gingival bleeding, and epistaxis
- Prolonged PT and PTT
- ↑ D-dimer and fibrin degradation products; ↓ fibrinogen
- Peripheral smear: Promyelocytes with red rod-like structures in the cytoplasm; myeloperoxidase+
- Cytogenetics: t(15, 17) translocation

What is the diagnosis?

Diagnosis is **acute promyelocytic leukemia (also called aPML and the M3 type of AML)**.

This script includes a coagulopathy due to the presence of DIC, which is most commonly seen in aPML. This is an important script to remember: When M3 AML presents with DIC, urgent prescription of an all-*trans* retinoic acid (ATRA) drug is necessary because aPML is one of the most malignant forms of AML (even though it's also one with the best prognosis when treated). The t(15, 17) translocation is one of the molecular clues to the diagnosis of aPML.

Dx: CBC or marrow biopsy showing characteristic promyelocytes $\pm$ Auer rods + flow cytometry/cytogenetics + evidence of DIC.

Tx: Immediate ATRA-based chemotherapy.

SCRIPT

Female patient in her 70s, with no complaints, presents for annual evaluation with:

- Pallor
- ↓ Hgb and Hct
- ± ↓ WBC, ↑ platelets, normal or ↑ MCV
- ↓ Reticulocyte count
- Peripheral smear: Pseudo-Pelger-Huet cells
- Normal serum Na, K, Cl, HCO_3^- , glucose, creatinine, AST, and ALT
- Bone marrow: Hypocellular
- Cytogenetics: 5q- deletion

What is the diagnosis?

Diagnosis is **5q- myelodysplasia**.

This subset of myelodysplasia is worth remembering because most patients are women and have a favorable prognosis. The 5q- is a big clue, as is the thrombocytosis (not thrombocytopenia, as in most cases of myelodysplasia). These patients often respond favorably to lenalidomide and have increased survival compared to other myelodysplasias. Pseudo-Pelger-Huet cells (buzzwords to remember!) are seen in myelodysplastic states, where the granulocytes have decreased segmentation.

Dx: Anemia + preserved or increased platelets + lack of blasts + marrow cells with 5q31 deletion.

Tx: Lenalidomide.

SCRIPT

Patient 50 years or older presents with:

- ↓ Hgb and Hct, normal MCV and MCHC
- ↑ WBC (Differential: Myelocytes, metamyelocytes, segmented neutrophils, basophils, eosinophils, < 2% blasts
- ↑ Plt
- ↓ Leukocyte alkaline phosphatase score
- Marrow biopsy: Hypercellular with granulocytic hyperplasia, < 20% blasts
- Cytogenetics: t(9;22)(q32;q11.2)

What is the diagnosis?

Diagnosis is **chronic myelogenous leukemia**.

The case could present a patient with fatigue, lymphadenopathy, splenomegaly, and petechiae/bleeding if the patient has a more advanced disease. The major clue here is the presence of the Philadelphia chromosome, the *BCR-ABL* translocation [t(9;22)], and the excess of granulocytes in various stages of development. Although it has poor sensitivity and specificity, the low LAP score may help you distinguish CML from a leukemoid reaction and polycythemia vera, both of which have increased LAP scores. If you see the same sort of presentation, but with low platelets, think more of myelodysplasia, not myeloproliferative disease. Remember: This is not acute leukemia because the peripheral blood contains a spectrum of differentiated granulocytes—acute leukemia is marked by maturation arrest and overproduction of blasts. Acute leukemia is defined by > 20% blasts in the marrow.

Dx: Leukocytosis with excess myeloid cells + evidence of Philadelphia chromosome (the chromosome itself evidence of the fusion gene, or evidence of the fusion mRNA).

Tx: Based on phase and patient's age; chronic and early accelerated phase is treated with a tyrosine kinase inhibitor; e.g., imatinib. Refractory and nonresponsive patients are treated with stem cell transplant.

SCRIPT

Patient 40 years or older presents with:

- Recurrent headaches
- Lightheadedness
- $\pm$ Erythromelalgia
- No fever or obvious inflammation
- Splenomegaly
- Normal WBC, Hgb, Hct; $\uparrow$ platelets $> 450,000/\mu\text{L}$
- Normal iron studies
- $\pm$ *JAK-2* mutation

What is the diagnosis?

Diagnosis is **essential thrombocythemia**.

Splenomegaly + thrombocytosis are the big clues. Always think about myeloproliferative disorders when you see an elderly person with a big spleen (although the script profiles a younger person). Erythromelalgia (painful red digits) also is seen in P. vera. Patients have normal life spans, but the big problem is future thrombotic events. A small number transform into AML, so a case could present acute leukemia in the context of a patient with PMH of ET. The case could include a description of the marrow, which is hypercellular and lacks t(9;22) on cytogenetics. The *JAK-2* mutation helps you exclude a secondary thrombocytosis, but the mutation doesn't help you distinguish between ET and P. vera. We don't know the significance of *JAK-2* yet.

Dx: ET is the only myeloproliferative disorder that is not defined by specific cytogenetic abnormalities and is diagnosed by excluding conditions (e.g., severe iron deficiency anemia) and other myeloproliferative disorders (e.g., CML) that result in platelets > 600,000.

Tx: 81 mg/day aspirin for vasomotor symptoms and to prevent thrombotic events ± hydroxyurea or anagrelide to prevent thrombotic events.

SCRIPT

Middle-age patient with h/o recurrent gout presents with:

- Recurrent headaches
- Lightheadedness
- Aquagenic pruritus
- Erythromelalgia
- Plethora
- Splenomegaly
- Pulse oximetry $\geq 92\%$
- $\uparrow$ Hgb, Hct, red cell mass, $\pm \uparrow$ WBC and Plt
- $\uparrow$ Leukocyte alkaline phosphatase score
- $\downarrow$ or normal blood erythropoietin levels
- $\pm$ *JAK-2* mutation

What is the diagnosis?

Diagnosis is **Polycythemia vera**.

When the red cell mass (or the hematocrit) is increased, first exclude chronic hypoxia and excess erythropoietin. Itching after a shower (aquagenic pruritus), painful red digits (erythromelalgia), and splenomegaly are big clues to the diagnosis. Always think about myeloproliferative disorders when you see splenomegaly associated with abnormalities in the red cells or platelets. Clinically, be very careful about making a diagnosis of P. vera in a smoker, as the patient could have another myeloproliferative disorder associated with secondary polycythemia due to smoking. As with essential thrombocythemia, these patients can degenerate into AML, so look out for a question that introduces acute leukemia in a patient with history of P. vera.

Dx: There is no diagnostic consensus, but most patients have increased red cell mass + normal pO_2 + exclusion of CML, ET, and myelofibrosis + hypercellular marrow with increased megakaryocytes.

Tx: Phlebotomy to keep Hct < 45% ± myelosuppression (hydroxyurea) + aspirin for vasomotor symptoms.

SCRIPT

Patient 60 years or older presents with:

- Severe fatigue
- Abdominal pain and/or fullness
- Massive splenomegaly
- ↓ Hgb and Hct
- ↑ or ↓ WBC and Plt
- Peripheral smear: Anisocytosis, poikilocytosis, and teardrops; large platelets and fragmented megakaryocytes
- ± Positive Coombs test
- Marrow biopsy: "Dry tap"

What is the diagnosis?

Diagnosis is **primary myelofibrosis**.

While myeloproliferative disorders can have splenomegaly (e.g., PV and CT), think about myelofibrosis (splenomegaly present in ~ 90% of patients) when a case describes massive splenic enlargement. Hepatomegaly is also seen in about 50%. Marrow biopsies are tough (resulting in a “dry tap”) because of the fibrosis, but some patients in early stages have hypercellular marrows with scant fibrosis. Buzzwords for this presentation are: Massive splenomegaly, teardrops, and dry tap.

Dx: Clinical + exclude other myeloproliferative disorders.

Tx: Transfusion support.

SCRIPT

Patient 70 years or older presents with:

- Painless cervical lymphadenopathy x weeks
- Wheals at sites of mosquito bites
- Splenomegaly
- $\uparrow$ WBC (Differential: $\uparrow$ Lymphocytes) $\pm$ $\downarrow$ Hgb, Hct, and Plt
- Peripheral smear: Smudge cells
- Positive Coombs test (if anemic)

What is the diagnosis?

Diagnosis is **B cell chronic lymphocytic leukemia/small lymphocytic lymphoma**.

This disease can present as a chronic leukemia or as an indolent lymphoma. B cell CLL has a bimodal age distribution: Older than 70 years and between 30 and 39 years. Autoimmune hemolytic anemia and thrombocytopenia often occur. Most patients don't have the exaggerated response to mosquito bites, but this is one diagnosis to consider when you see such a response.

Dx: Monoclonal B cell lymphocytosis (CD5+) or expansion of the marrow with the same cells.

Tx: Observation in early stage $\pm$ localized radiation therapy $\pm$ various treatment options that include fludarabine therapy, pentostatin therapy, alemtuzumab, or stem cell transplant.

SCRIPT

Patient 50 years or older presents with:

- Fatigue, weakness
- $\pm$ Abdominal fullness
- Splenomegaly
- $\downarrow$ WBC, Hgb, Hct, and Plt
- Peripheral smear: Cells with indistinct cytoplasm and hair-like projections

What is the diagnosis?

Diagnosis is **hairy cell leukemia**.

HCL actually is now considered an indolent lymphoma. The exam may give you a photo showing the hairy cells. The case might mention that bone marrow biopsy resulted in a "dry tap," which occurs when marrow is hard to extract because of fibrosis (seen in some cases of HCL).

Dx: Hairy cells in the peripheral blood + hairy cells in the bone marrow with increased reticulin fibers.

Tx: Observation $\pm$ splenectomy or chemotherapy with interferon or cytotoxics.

SCRIPT

Patient 60 years or older presents with:

- Fatigue and malaise
- Recurrent headaches, dizziness, ataxia, and tinnitus
- Recurrent epistaxis
- Symmetric, distal paresthesias
- $\pm$ Hepatosplenomegaly and lymphadenopathy
- “Sausage veins” on fundoscopic exam
- $\downarrow$ Hgb and Hct
- Rouleaux formation
- $\pm$ Positive Coombs test
- $\uparrow$ β_2 microglobulin level
- SPEP: IgM monoclonal spike

What is the diagnosis?

Diagnosis is **Waldenström macroglobulinemia**.

If you guessed myeloma or MGUS, it was probably because you loosely associate SPEP or “monoclonal spikes” with myeloma. The key is to know that Waldenström’s overproduces the IgM paraprotein, but myeloma rarely does—it usually overproduces IgG. Also, myeloma is not associated with the hyperviscosity of Waldenström’s, evident in the symptom list here of headaches and epistaxis. The case could include a marrow biopsy result and would show > 10% clonal **lymphoplasmacytic** cells. These cells do have a specific cellular immunophenotype, but the specifics are probably too specialized for general medicine Boards.

Dx: Clinical + IgM monoclonal gammopathy + marrow biopsy showing > 10% infiltration with lymphoplasmacytic cells + flow cytometry.

Tx: Plasmapheresis for hyperviscosity + rituximab ± cyclophosphamide/doxorubicin/vincristine/prednisone or other chemotherapeutic regimen.

SCRIPT

Patient 60 years or older presents with:

- Fatigue and pain in the back and sternum
- Pallor
- ↓ Hgb and Hct with normal MCV and MCHC
- ↑ Serum creatinine, T. protein, and Ca^{2+}
- U/A: ± Protein, no cells or cellular casts
- SPEP/UPEP: Monoclonal gammopathy
- Bone scan: No enhancement in spine or chest

What is the diagnosis?

Diagnosis is **multiple myeloma**.

Myeloma is easy to recognize because it has the multiple features of bone pain with anemia, kidney injury, and hypercalcemia. Monoclonal gammopathy of undetermined significance (MGUS) does not have these systemic features. Waldenström's presents with hyperviscosity and does not have the bone or renal lesions. Remember that plain films are required to show the bony lesions.

Dx: Clinical + monoclonal gammopathy + CRABs (calcium derangement, renal insufficiency, anemia, bony lytic lesions) + marrow infiltration > 10% with clonal **plasma** cells.

TX: Variable, depending on whether patient will undergo stem cell transplant; specifics too specialized for general medicine Board exam.



SCRIPT

Patient 60 years or older presents with:

- Fatigue
- ↑ T. protein
- Normal CBC, serum creatinine, and Ca
- U/A: No protein, no cells or cellular casts
- SPEP/UPEP: Monoclonal gammopathy with M protein < 1.5 g/dL

What is the diagnosis?

Diagnosis is **monoclonal gammopathy of undetermined significance**.

MGUS looks like myeloma on a serum or urine protein electrophoresis, but MGUS has a lower concentration of M protein (< 3 g/dL) and does not have associated anemia, hypercalcemia, kidney injury, or lytic bone lesions on a skeletal survey. If a marrow biopsy is done, MGUS has $< 10\%$ plasma cells.

Dx: Monoclonal gammopathy + $< 10\%$ infiltration of marrow with clonal **plasma** cells.

Tx: Observation.

SCRIPT

Patient with atrial fibrillation on warfarin is given piperacillin-tazobactam for 10 days to treat ascending cholangitis.

The normal dose of warfarin is given, but the patient's INR increases.

What is the most likely cause of the increase in INR?

The most likely cause is **loss of vitamin K-producing organisms in the gut due to use of broad-spectrum antimicrobials**.

Certain cephalosporins can also do this when their side chain antagonizes vitamin K.

Dx: Clinical.

Tx: Stop the offending antimicrobial

SCRIPT

Patient who has received previous transfusions receives another transfusion of packed red cells. One week later, he develops:

- Fever and shortness of breath
- ↓ Hgb and Hct
- ↑ T. bili and I. bili

What is the diagnosis?

Diagnosis is **delayed hemolytic transfusion reaction**.

Note the presence of hemolysis, as reflected by the increase in the I. bili, but the event occurred a week after transfusion. This phenomenon is usually due to Rh incompatibility or minor antigen mismatches that results in the formation of low levels of antibodies after the original transfusion (such a low level that the cross-matching process doesn't pick them up). Anamnestic production of antibody occurs with subsequent transfusion. Most cases do not result in symptomatic hemolysis; this presentation is an extreme case.

Dx: Clinical + evidence of hemolysis (increased LDH and indirect hyperbilirubinemia + low haptoglobin and positive Coombs test) + blood bank evaluation of pre- and post-transfusion samples with repeat cross-matching.

Tx: Usually supportive care is adequate.



Infectious Disease

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SCRIPT

More than 6 hours after eating mashed potatoes with brown gravy at an office party, several workers develop:

- Profuse watery diarrhea x hours
- Crampy abdominal pain
- No vomiting

What is the diagnosis?

Diagnosis is ***Clostridium perfringens* food poisoning**.

Remember the key associations for *C. perfringens* food poisoning: Watery diarrhea and crampy abdominal pain; brown gravy and meats; ingestion of large amounts of bacteria, which then form toxins in the intestine (symptoms occur later, after ingestion). You might have guessed *Yersinia enterocolitica*. The *Yersinia* association is with ingestion of chitterlings (pronounced "chitlins"). *Yersinia* diarrhea usually lasts much longer, however, and can be associated with significant morbidity, including mesenteric adenitis.

Dx: Toxin assay of stool.

Tx: Supportive ± antidiarrheal agent if the patient has no fever and nonbloody stools.

SCRIPT

Elderly patient presents with acute onset:

- Confusion and fever
- ↑ WBC
- Differential: ↑ Neutrophils
- CSF: ↑ Leukocytes > 100/hpf (polys, lymphs, and monos), ↑ protein, ↓ glucose, Gram stain: No organisms
- Blood cultures: + Gram-positive diplococci

What is the diagnosis?

Diagnosis is **pneumococcal meningitis**.

Bacterial morphology always helps you make the diagnosis. Pneumococci are "lancet-shaped gram-positive diplococci." The organisms are usually present on CSF Gram stain; however, a lack of organisms on Gram stain does not exclude bacteria as the cause.

Dx: CSF analysis for cell count, glucose, protein, Gram stain and bacterial culture + blood cultures ± urinary pneumococcal antigen.

Tx: Vancomycin + ceftriaxone, then narrow coverage based on susceptibility results.

SCRIPT

Previously healthy patient presents 3 days after being hit in the arm with a softball (causing no serious injury) with:

- Fever, rigors, and headache
- Severe pain in the arm with crepitus and bullae
- Diarrhea $\pm$ abdominal pain and vomiting
- $\downarrow$ BP
- Nonpitting edema
- Mucosal hyperemia and diffuse erythroderma $\pm$ vesicles/bullae
- $\uparrow$ or $\downarrow$ WBC; $\downarrow$ Hgb, Hct, and Plt
- Differential: $\uparrow$ Neutrophils and band forms
- $\pm$ $\downarrow$ Serum Na, albumin, Ca, and PO_4
- $\pm$ $\uparrow$ AST and ALT, serum creatinine, and CPK
- Blood cultures: Gram-positive cocci in chains

What is the diagnosis?

Diagnosis is **GAS skin and soft tissue infection (probably necrotizing fasciitis) with toxic shock syndrome**.

Be very alert to patients who have complaints of trauma then develop subsequent pain out of proportion to what you see on the physical exam. This is how GAS necrotizing fasciitis presents (and can be associated with development of toxic shock). Crepitus and bullous lesions are very disturbing because they indicate possible severe, deep, underlying fascial and muscle infections, so be aggressive in your workup when you feel crepitus or see bullous lesions.

Dx: Clinical (hypotension + ≥ 2 of following: Acute kidney injury, coagulopathy, liver involvement, ARDS, diffuse erythematous rash, soft tissue necrosis) + blood cultures (often positive) + culture of involved mucosal surface or wound(s).

Tx: Supportive care + surgical drainage of pus if present + PCN G and clindamycin.

SCRIPT

1–6 hours after ingesting fried rice at a local restaurant, patient presents with:

- Nausea and vomiting
- No diarrhea

What is the diagnosis?

Diagnosis is ***Bacillus cereus* food poisoning**.

Remember the key associations for *B. cereus*: vomiting without diarrhea, rice, ingestion of pre-formed toxin (so symptoms occur quickly). You might have guessed *S. aureus*, which causes a similar presentation yet is more commonly associated with custards; mayo-containing salads; cold chicken; cold, cooked eggs; and casseroles.

Dx: Clinical (stool culture + toxin assay used to investigate outbreaks only).

Tx: Supportive.

SCRIPT

Patient with h/o solid organ transplant 4 months ago, on appropriate immunosuppressive drugs, presents with:

- Fever
- Cough, productive of scant sputum, and dyspnea
- Localized rales and egophony
- $\pm$ Hypoxemia
- CXR: Diffuse interstitial streaks
- Sputum Gram stain: No organisms
- Rapid antigen tests for influenza and RSV: Negative
- Bronchoalveolar lavage: Organisms visible on Gomori methenamine silver stain

What is the diagnosis?

Diagnosis is ***Pneumocystis jiroveci* pneumonia**.

Opportunistic infections are the most common etiologies of infection in patients 1–6 months after solid organ transplant. *Pneumocystis* is one of the most common. The exam might give you a positive direct fluorescent antibody stain instead of the Gomori methenamine silver stain, because DFA is the most commonly used method for detection. Respiratory viruses are also common in this time period—adenovirus would be one to consider since influenza and RSV tests were negative. In the immunosuppressed person with new pneumonia, it's pretty safe to empirically diagnose *Pneumocystis* until proven otherwise, because the treatment is very specific.

Dx: Staining of respiratory specimens (from induced sputum or bronchoscopy) to identify the organisms (DFA test or GMS stain).

Tx: TMP/SMX $\pm$ prednisone (if $pO_2 \leq 70$, A-a gradient ≥ 35 , or resting hypoxemia on pulse ox).

SCRIPT

Healthy high school football player presents with:

- Recurrent painful, erythematous, pus-filled skin nodules that sometimes require incision and drainage
- Normal serum blood glucose
- HIV test: Negative

What is the diagnosis?

Diagnosis is **recurrent furunculosis**.

Staph typically infects hair follicles. Tiny punctate lesions are called folliculitis, larger lesions with drainable pus are called furuncles, and a coalescence of furuncles is called a carbuncle. Testing points to remember: Patients who have recurrent furuncles are usually colonized in the anterior nares with aggressive strains of either MRSA or MSSA. Risk factors include contact sports, so the history of football in this scenario is very relevant. Patients often have recurrences until you eradicate the staph colonization of the anterior nares. The history of contact sports and pus helps you identify the lesions as furuncles.

Dx: Clinical $\pm$ culture of exudate from the lesions $\pm$ culture of the anterior nares.

Tx: Incision and drainage of lesions $\pm$ eradication of staph from the anterior nares using mupirocin.

SCRIPT

Patient with h/o solid organ transplant 1 year ago, on appropriate immunosuppressive drugs, presents with:

- Fever
- Cough, productive of purulent sputum
- Localized rales and egophony
- $\pm$ Hypoxemia
- CXR: Lobar consolidation
- Sputum Gram stain: Gram-positive cocci in short chains

What is the diagnosis?

Diagnosis is **community-acquired pneumonia**.

The key to this case is knowing what organisms cause disease, and when, after a solid organ transplant. Community organisms are most likely to cause pneumonia when the patient has progressed > 6 months after transplant. Organisms would include pneumococcus, respiratory viruses, and *Legionella*. If the question-writer is kind, they might include the description of "lancet-shaped diplococci" in the Gram stain to clue you into pneumococcus as an etiology. Do know that pneumococcus can be seen in short chains also? *Aspergillus* infections can occur in this time frame but are less common and rarely lobar.

Dx: Clinical $\pm$ CXR $\pm$ sputum Gram stain and culture.

Tx: Depends on severity and whether patient requires hospital admission. Empiric regimens: Healthy outpt + ML, doxy; comorbidities, outpt = R-FQ or BL + either ML or doxy; non-ICU, hospital = (BL + either ML or doxy) or R-FQ monotherapy; ICU, hospital = BL + either IV azithro or R-FQ + either vanco or linezolid if suspect MRSA. R-FQ = levo- or moxifloxacin; BL = ceftriaxone, cefotaxime, amp-sulbactam, ertapenem, or ceftaroline. ML = azithromycin or clarithromycin.

SCRIPT

Previously healthy menstruating female presents 3 days into her menstrual cycle with:

- Fever and rigors
- Headache
- Diarrhea $\pm$ abdominal pain and vomiting
- $\downarrow$ BP
- Mucosal hyperemia
- Diffuse erythroderma
- Nonpitting edema
- $\uparrow$ or $\downarrow$ WBC
- Differential: $\uparrow$ Neutrophils and band forms
- $\downarrow$ Hgb, Hct, and Plt
- $\pm$ $\downarrow$ Serum Na, albumin, Ca, and PO_4
- $\pm$ $\uparrow$ Serum AST and ALT, creatinine and CPK
- Blood cultures: No growth

What is the diagnosis?

Diagnosis is **staph toxic shock syndrome**.

Expect a TSS Board question to present overwhelming sepsis in the context of a menstruating female or a post-surgical wound infection. The CDC definition of TSS is easy to remember and includes the triad of shock, fever, and rash, along with involvement of 3 or more organ systems. Blood cultures in staph TSS are usually negative, but positive in strep TSS. Epidemiology is important in making a diagnosis in this case. This is one of the few infections that will take a young person from healthy to deathly sick in only a couple of days. You might have suspected RMSF or meningococcemia, both of which can also cause severe disease in otherwise healthy young people, but neither presents with erythroderma. With RMSF, the history would include tick exposure and would describe a petechial rash. With meningococcemia, the history might include meningelial signs and describe petechiae and purpura. There is no special association between menstruation and RMSF or meningococcemia. You also might have suspected scarlet fever because you saw erythroderma. Recognize that scarlet fever is due to streptococcal pharyngitis and this patient has no sore throat.

Dx: Clinical: CDC case definition of rash.

Tx: Supportive care + surgical drainage of pus if present + vancomycin and clinda.

SCRIPT

A 40-year-old male adventure sports enthusiast presents with recent onset of right ear pain. He recently took part in a “mad mudder” event.

Physical exam reveals:

- No hearing loss
- Increased pain with manipulation of the right pinna
- TM not visible due to pain with examination maneuvers
- Minimal mucopurulent discharge in rt. external canal
- Moderate swelling of rt. external canal
- No fever

What is the diagnosis?

Diagnosis is **otitis externa**.

This patient has swimmer's ear. This is an external otitis often caused by *Pseudomonas aeruginosa*. Untreated, especially in a diabetic patient, this can progress to malignant (necrotizing) otitis externa. This is invasive and highly destructive. > 90% of these patients are diabetics.

Dx: Clinical.

Tx: Treatment is topical quinolones; if moderately severe, give oral quinolones. IV antipseudomonal antibiotics are required for diabetic patients.



SCRIPT

Adolescent patient with no respiratory symptoms develops acute onset:

- Pharyngeal pain with tonsillar swellings and exudate
- Fever
- Anterior cervical adenopathy
- Heterophile antibody: Negative

What is the diagnosis?

Diagnosis is **GAS pharyngitis**.

Viral pharyngitis more often is associated with respiratory symptoms of coryza and cough, where true GAS pharyngitis rarely is. The 3 findings listed in this script (adenopathy, fever, exudative pharyngitis) are the most specific collection of findings for true strep. You might have guessed *Arcanobacterium* as a cause, and that would be reasonable, but one clue to this organism is an erythematous rash, which is not present in this patient. The heterophile antibody is the "monospot" test, which is (+) in 60–80% of EBV patients and makes the diagnosis of EBV less likely.

Dx: Rapid strep test; throat cultures are no longer recommended in adults, even when the rapid test is negative.

Tx: Oral penicillin V; amoxicillin, 1st generation cephalosporins, and IM PCN G are alternatives.

SCRIPT

Adolescent patient with no respiratory symptoms develops acute onset of:

- Pharyngeal pain with tonsillar swellings and exudate
- An erythematous, sandpaper-like, desquamating rash that spares a circular area around the mouth
- Strawberry tongue
- Petechial lines that concentrate in the antecubital fossa, axilla, and groin

What is the diagnosis?

Diagnosis is **scarlet fever**.

Key words for scarlet fever are "circumoral pallor" (the pale area around the mouth), "Pastia lines" (petechial lines in the skin creases), and "desquamation." *Arcanobacterium* pharyngitis can present with this same scarlatiniform rash but lacks Pastia lines and desquamation. Enteroviral pharyngitis may have a rash but it is vesicular/pustular. EBV pharyngitis may have a diffuse rash but would not have Pastia lines
Dx: Rapid strep test; throat cultures are no longer recommended in adults, even when the rapid test is negative.

Tx: Oral penicillin V; amoxicillin, 1st generation cephalosporins, and IM PCN G are alternatives.

SCRIPT

Sexually active patient who admits to several recent months of unprotected sex with multiple partners presents with:

- Fever and headache
- Arthralgias and myalgias
- Axillary and cervical lymphadenopathy
- Pharyngeal pain with normal tonsils and no exudates
- Several shallow, erythematous, painful, mucosal ulcerations
- Erythematous macular rash on the trunk, upper extremities, and face

What is the diagnosis?

Diagnosis is **primary HIV infection**.

Think about primary HIV infection in any patient who presents with fever and rash. EBV mononucleosis may have a diffuse rash (and almost always does after exposure to ampicillin), but would not cause the mucosal ulcerations. GAS scarlet fever would have the erythematous rash, but not the mucosal ulcerations. Rubella does not cause pharyngitis or mouth ulcers. There are 2 criteria for SLE (oral ulcers and arthralgias), but the diffuse rash would be unusual. Secondary syphilis causes mucosal ulcers, but they are painless, and pharyngitis is rare.

Dx: HIV viral load by PCR > 10,000 copies/mL; measurement of p24 antigen is an alternative but is less sensitive than viral load.

Tx: Initiation of ART.



SCRIPT

Elderly hospitalized diabetic with h/o heart failure presents with:

- Fever
- Cough
- Confusion
- Hypoxemia
- CXR: Lobar consolidation
- Blood cultures: Gram-positive cocci in chains
- Sputum Gram stain and culture: Gram-positive cocci in long chains

What is the etiology of the pneumonia?

The etiology is **group B streptococci** (*S. agalactiae*).

GBS is now recognized as a bona fide etiology of severe pneumonia in the elderly. You should know its unique features: High rate of coexisting bacteremia, often causes confusion, and predilection for hospitalized patients with history of CHF and/or diabetes. You might have guessed pneumococcus as the cause, but they are lancet-shaped diplococci and do not appear in long chains.

Dx: Cultures of respiratory samples or blood.

Tx: Intravenous PCN G.



SCRIPT

Middle-aged patient presents with several weeks h/o:

- Fever
- Arthralgias
- New diastolic murmur at the right upper sternal border
- Blood cultures: *S. bovis*
- Echo: Large vegetation on the aortic valve

What additional study should this patient receive?

The additional study this patient should receive is **colonoscopy**.
The patient has a 20–30% chance of having colon cancer.

SCRIPT

Older man with a recent h/o cystoscopy presents with days to weeks of:

- Fevers and chills
- Arthralgias
- Weight loss
- New diastolic murmur, loudest at the upper right sternal border
- Blood cultures: Gram-positive cocci in chains; sensitive to penicillin, ampicillin, vancomycin, and gentamicin

What is the diagnosis?

Diagnosis is **enterococcal endocarditis**.

Clues in this case are the history of genitourinary instrumentation and subacute presentation of bacteremia. If the gram-positive cocci in the blood were staph, the clinical presentation would be more fulminant. You might have guessed endocarditis due to viridans streptococci, but those organisms come from the mouth and are not associated with recent history of GU manipulation. Enterococcal isolates are generally tested for susceptibility to penicillin, ampicillin, vancomycin, and aminoglycosides only.

Dx: Revised Duke criteria, which includes bacteriologic + echocardiographic findings (in this case it would show a new regurgitant murmur).

Tx: Depends on susceptibility; gentamicin + penicillin G, ampicillin, or vancomycin x 4–6 weeks depending on duration of symptoms prior to diagnosis.

SCRIPT

Elderly patient presents with acute onset:

- Confusion
- Fever
- ↑ WBC
- CSF: ↑ Leukocytes > 100/hpf (polys, lymphs, and monos), ↑ protein, ↓ glucose, Gram stain: No organisms
- Blood cultures: + Gram-positive rods

What is the diagnosis?

Diagnosis is ***Listeria meningitis***.

Recognize that the CSF Gram stain often does not show organisms in patients with *Listeria meningitis*, but this script shows evidence of meningeal involvement because of the CSF pleocytosis and increased protein. The specific clues in this case are: Confusion, elderly person, and CSF pleocytosis. Remember that *Listeria* are gram-positive rods.

Dx: CSF for glucose, protein, cell count with differential + culture or organism from blood or CSF.

Tx: Either ampicillin or penicillin G. Gentamicin often added for synergy, but no studies available to assess additional efficacy.



SCRIPT

Patient with known heme malignancy and a central venous catheter presents with:

- Fever
- Blood cultures from the catheter: Gram-positive rods, identified as *Corynebacterium jeikeium*

What drug should be prescribed?

The drug that should be prescribed is **intravenous vancomycin**.

Know that *C. jeikeium* is an etiology of line-associated bacteremia and sepsis, especially in patients with heme malignancies. The only effective drug is vancomycin, and it should be started immediately when you suspect this organism. This gram-positive rod should never be viewed as a contaminant even if only one blood culture grows.

SCRIPT

Young adult who did not receive childhood vaccines returns from a vacation to South America with:

- Low-grade fever
- Pharyngeal pain
- Gray pharyngeal exudate

What is the diagnosis?

Diagnosis is **diphtheria**.

This diagnosis is pretty easy to remember, but the major cause of mortality from diphtheria is not (toxin induced myocarditis). Stridor and respiratory compromise also can occur if the membrane becomes large. The systemic toxicity is proportional to the size of the pharyngeal membrane.

Dx: Toxin assay + culture of organism from respiratory specimens.

Tx: Either erythromycin or penicillin G + antitoxin. All cases should be treated.

SCRIPT

Adolescent patient develops acute onset:

- Pharyngeal pain with tonsillar swellings and exudate
- Fever
- Anterior cervical adenopathy
- Erythematous scarlatiniform rash on the extremities and thorax
- Negative rapid strep screen
- Negative throat culture

What is the diagnosis?

Diagnosis is ***Arcanobacterium pharyngitis***.

This organism can cause an illness that looks like scarlet fever, but the cultures and rapid screens for GAS are negative. You might have guessed EBV mononucleosis, but remember that mono is less commonly associated with a rash unless the patient is treated with ampicillin or amoxicillin.

Dx: Rapid strep test (negative result) + throat culture.

Tx: Erythromycin.

Misc: In adults whose rapid strep test is negative, throat cultures are no longer recommended, so this diagnosis usually will not be made.

SCRIPT

Patient who works in a textile factory presents with:

- Upper extremity skin lesion that began as an itchy, erythematous papule → central vesicle → painless, black center with significant surrounding edema

What is the diagnosis?

Diagnosis is **cutaneous anthrax**.

The occupational exposure and painless nature are the clues to cutaneous anthrax. There are other lesions with necrotic centers. Ecthyma gangrenosum is caused by *Pseudomonas*, yet occurs in neutropenic or AIDS patients, and they are septic. Systemic endemic fungi infections can have necrotic lesions but there is usually infection elsewhere, typically the lung.

Dx: Gram stain and culture of the lesion. PCR testing is also available.

Tx: Empiric because culture takes too long, and infection can become systemic and deadly. Oral ciprofloxacin or doxycycline for cutaneous disease is used empirically then can be narrowed to penicillin V or amoxicillin if susceptible.

SCRIPT

Healthy patient with 2–3 day h/o malaise, fever, and headache presents with rapidly progressive:

- Cough and hypoxemia
- Confusion
- ↓ BP, ↑ PR, ↑ RR
- CXR: Widened mediastinum
- CSF: ↑ Leukocytes and protein, ↓ glucose;
Gram stain: Large gram-positive rods resembling “box cars”

What is the diagnosis?

Diagnosis is **inhalation anthrax**.

The initial pulmonary presentation followed by sepsis is consistent with any severe community-acquired pneumonia (such as *Legionella*, influenza with or without secondary bacterial pneumonia, tularemia, plague, or hantavirus. However, the widened mediastinum (enlarged mediastinal nodes) and subsequent meningitis are clues to inhalation anthrax.

Dx: Gram stain and culture of sputum, blood, pleural fluid CSF. PCR testing is also available.

Tx: Empiric because cultures take too long, and infection is deadly; intravenous ciprofloxacin + imipenem, rifampin, vancomycin, penicillin, ampicillin, chloramphenicol $\pm$ clindamycin.

SCRIPT

Patient with h/o AML s/p BMT with h/o prolonged neutropenia has the following:

- Fever on vancomycin, piperacillin-tazobactam, and caspofungin
- Painful, erythematous, nodular skin lesions on the trunk and extremities, some of which develop a necrotic center
- Skin biopsy: Acute branching septate hyphae
- Blood cultures: Conidia

What is the diagnosis?

Diagnosis is **disseminated fusariosis**.

Yep, this is a hard script. A stable but immunosuppressed patient with red nodular skin lesions is most likely to have either disseminated *Candida* or *Fusarium*. "Acute branching septate hyphae" in the biopsy tells you that either *Aspergillus* or *Fusarium* is present. *Aspergillus* does not present with disseminated erythematous nodular skin lesions, nor grow in blood. Thus, an assumption can be made that the hyphae in the biopsy is *Fusarium*. ~ 50% of patients with disseminated fusariosis will have fungemia. *Candida* in the blood is in the form of a yeast, so if this were that organism, the lab would report yeast forms, not conidia. *Fusarium* grows in the blood as a mold, so mold-like features are seen, termed "conidia." It is quite rare for fungi to grow as a mold in the blood; as such, this case should really stick out in your mind! *Fusarium* and *Aspergillus* are the dreaded organisms that can still thrive in immunosuppressed patients who are receiving very broad-spectrum antibiotics and antifungals. If this were *Candida*, it would have to be the species that are not sensitive to caspofungin. The microbiologic specifics of this case might be more than you need to know as an average internist, but these infections are becoming more common.

Dx: Blood cultures + skin biopsy with path and cultures (bacterial and fungal).

Tx: Liposomal amphotericin B ± voriconazole + resolve with neutropenia.



SCRIPT

Young patient with h/o splenectomy develops fever and:

- Rigors and confusion
- ↓ BP and ↑ HR
- Petechiae and purpura
- ↓ WBC, Hgb, Hct, and Plt
- Differential: ↑ Neutrophils and band forms
- Peripheral smear: Dohle bodies and toxic granulations
- ↑ AST, ALT, and serum creatinine
- Prolonged PT and PTT
- ↑ D-dimer and fibrin degradation products with ↓ fibrinogen
- Buffy coat: Gram-positive diplococci

What is the diagnosis?

Diagnosis is **pneumococcal sepsis**.

The history of splenectomy should cause you to consider encapsulated bacteria as a cause of sepsis. Fulminant pneumococcal disease is the most common cause of sepsis in the splenectomized patient, and it can present with DIC. Sometimes no source is obvious. The clinical scenario may or may not give you "gram-positive, lancet-shaped diplococci" as a clue.

Dx: Blood cultures $\pm$ urinary pneumococcal antigen.

Tx: Vancomycin + either ceftriaxone or cefotaxime, then narrow coverage based on susceptibility results.



SCRIPT

Freshman college student, who lives in a dormitory, presents with acute onset:

- Fever and headache
- Nausea and vomiting
- Slight confusion
- Myalgias
- ↑ WBC, ↓ Hgb and Hct
- CXR: Normal
- CSF: Normal opening pressure, ↑ leukocytes (polys), ↑ protein, ↓ glucose; Gram stain: Gram-negative cocci

What is the diagnosis?

Diagnosis is **meningococcal meningitis**.

The demographics are very important in this script: Young college student, living in a dormitory. These patients are at increased risk. Think about this possibility when you see any young patient with fever, headache, and confusion. Meningococcal meningitis progresses quite rapidly from healthy to very sick. Meningococcemia with or without meningitis can present with marked resemblance to RMSF and pneumococcal disease with DIC. All can have petechial/purpuric rashes, increased transaminases, and abnormal PT/PTT with increased fibrin degradation products (if DIC is present). The epidemiology and exposure histories will help you make the correct diagnosis.

Dx: Blood culture + CSF cell count and differential, glucose, protein, Gram stain, and culture + tissue biopsy with culture if skin lesions present; susceptibilities on isolates are important.

Tx: Based on susceptibility results; ceftriaxone with change to PCN G if susceptible. Prophylaxis for **close contacts** only (household or oral secretion exposures) with rifampin, ciprofloxacin, or ceftriaxone.

SCRIPT

Young patient who stepped on a nail while wearing tennis shoes presents with:

- Fever
- Extensive soft tissue pain and swelling at puncture site
- ↑ ESR

What is the diagnosis?

Diagnosis is ***Pseudomonas* skin and soft tissue infection**.

Did you miss this? If you did, then say to yourself 50 times:

Shoe = *Pseudomonas*. More likely, you're going to get the answer correct but not remember the specific treatment. Be sure you know the antipseudomonal antibiotics.

Dx: Culture.

Tx: Oral or IV drug depends on extent of sickness and organism's susceptibilities. The only oral drugs are quinolones; parenteral choices include ceftazidime, cefepime, imipenem, gentamicin, tobramycin, ciprofloxacin, aztreonam, piperacillin-tazobactam, or ticarcillin-clavulanic acid. For very sick individuals, typically 2 antipseudomonal drugs are used with 1 from each of following categories: Antipseudomonal beta-lactams + either aminoglycoside or quinolone.

SCRIPT

Patient with HIV/AIDS and CD4 count $< 50/\mu\text{L}$ is hospitalized for:

- Confusion
- Fevers
- Multiple erythematous skin papules that develop painless central ulcerations and necrosis
- Blood cultures: Gram-negative rods

What is the diagnosis?

Diagnosis is **ecthyma gangrenosum and *Pseudomonas* bacteremia**.

Any time you see disseminated skin lesions with central necrosis in an immunosuppressed person, think about *Pseudomonas* bacteremia, especially if the patient has an indwelling central catheter. You could have considered disseminated fungal infections, such as *Candida*, but those lesions generally do not develop central necrosis. You also might have thought of cutaneous anthrax, but those patients usually do not have multiple lesions and initially are not septic. The Gram stain of the blood definitively tells you what is going on with this script. Patients with HIV/AIDS and severe immunosuppression are at-risk for spontaneous *Pseudomonas* bacteremia and pneumonia.

Dx: Culture.

Tx: 2 antipseudomonal drugs are combined with 1 from each of following categories: Antipseudomonal beta-lactams (pip-tazo, ticarcillin-clav, cefepime, ceftazidime) + either aminoglycoside (gent or tobra) or quinolone (ciprofloxacin).

SCRIPT

Young patient who is fond of snakes develops:

- Fever
- Bloody diarrhea
- Crampy abdominal pain
- Fecal leukocytes
- Negative *C. difficile* toxin assay

What is the diagnosis?

Diagnosis is **nontyphoidal *Salmonella* gastroenteritis**.

Remember the association between reptiles and amphibians and *Salmonella*. Eggs and contaminated poultry are also important sources. *S. typhimurium* and *S. enteritidis* are the usual species isolated in these cases. Recall that typhoid is caused by *S. typhi*.

Dx: Stool cultures

Tx: Supportive; only certain patient groups merit treatment and include patients at high risk for invasive disease (infants, patients with immunodeficiencies such as HIV/AIDS) and those with severe presentation (high fevers and lots of diarrhea requiring hospitalization for volume loss). Others should not be treated because treatment prolongs the carrier state, does not affect the duration of illness, and promotes resistance. If Rx is required, use ciprofloxacin, TMP/SMX, amoxicillin, ceftriaxone, or cefotaxime.



SCRIPT

Patient, who did not receive any pre-travel vaccinations, presents 30 days after returning from a visit to India with:

- 2 weeks of fever
- Chills
- Abdominal pain
- Weight loss
- Salmon-colored macular rash on the trunk
- ↓ HR when febrile

What is the diagnosis?

Diagnosis is **typhoid fever**.

The travel history, rash, and relative bradycardia are big clues to this diagnosis. The term for the rash is "rose spots," but the script describes the rash to you, instead of using the classic term. Be sure you know what rose spots look like.

Dx: Cultures of blood, stool, and rose spots. Bone marrow cultures have the highest yield. Cultures may require prolonged incubation. Susceptibility results are important.

Tx: Ceftriaxone, ciprofloxacin, or azithromycin; specific drug choice depends on extent of illness and local susceptibility patterns. Watch out for ileal perforation as a complication.

SCRIPT

Homeless person presents with:

- Fever
- Chills
- Headache
- Weakness
- Pain and swelling in an inguinal lymph node with overlying erythema
- Nodal aspirate: Gram stain shows gram-negative bacilli and cocco-bacilli

What is the diagnosis?

Diagnosis is **bubonic plague**.

This form of plague is transmitted via rodent fleas, so patients who have exposure to rodents may become infected. The inguinal bubo, and its Gram stain, are the biggest clues to diagnosis in this case. Sometimes *Yersinia* may grow in blood cultures, and organisms may be described as having a "safety pin" appearance, in addition to bacilli or coccobacilli.

Dx: Gram stain and culture of clinical specimens (blood, sputum, CSF, lymph node aspirates) or Wright stain of peripheral blood (may show safety pin-shaped organisms) or 4-fold rise in acute and convalescent IgG and IgM serum titers $\pm$ PCR or ELISA testing on specimens in research settings.

Tx: Streptomycin; gentamicin is an alternative.

SCRIPT

Homeless person presents with:

- Fever
- Chills
- Headache
- Weakness
- Dyspnea and cough
- Pleuritic chest pain and hemoptysis
- Confusion
- Pain and swelling in an inguinal lymph node
- CXR: Diffuse pulmonary infiltrates

What is the diagnosis?

Diagnosis is **pneumonic plague**.

The important fact to remember about pneumonic plague is that it is highly contagious, even though the bubonic form (from which this script developed) requires the vector for transmission. Make sure to recognize the bubo in the script!

Dx: Gram stain and culture of clinical specimens for *Yersinia pestis* (blood, sputum, CSF, lymph node aspirates) or Wright stain of peripheral blood (may show safety pin-shaped organisms) or 4-fold rise in acute and convalescent IgG and IgM serum titers $\pm$ PCR or ELISA testing on specimens in research settings.

Tx: Streptomycin; gentamicin is an alternative + respiratory isolation.



SCRIPT

Bovine rancher with a known bicuspid valve develops:

- Prolonged fevers
- Scattered lymphadenopathy
- Hepatosplenomegaly
- New diastolic murmur at the left upper sternal border
- Increased CRP
- Several sets of negative blood cultures
- Echo: Aortic vegetation with regurgitation
- Negative *Coxiella* serology

What is the diagnosis?

Diagnosis is ***Brucella endocarditis***.

Brucella and *Coxiella* are both causes of culture-negative endocarditis.

Dx: Revised Duke Criteria, which includes bacteriologic (Gram stain and culture of clinical specimens [blood, valve, marrow aspirate, liver biopsy]) + echocardiographic findings. *Brucella* can be diagnosed by a 4-fold rise in acute and convalescent IgG and IgM serum titers at least 2 weeks apart or positive titer > 1:80 in nonendemic areas ± PCR in research settings. *Coxiella* causing chronic Q fever can be diagnosed by an IgG titer of > 1:800.

Tx: Doxycycline + streptomycin or gentamicin ± rifampin



SCRIPT

4 days after killing and skinning a rabbit, patient presents with:

- Fever
- Chills
- Headaches
- Erythematous papule on the hand
- Axillary lymphadenopathy

What is the diagnosis?

Diagnosis is **tularemia**.

An outbreak of tularemia occurred on Martha's Vineyard in the early 2000s in a population of landscapers who presumably came into contact with *F. tularensis* while mowing deep grass. It's a good idea for you to associate tularemia with landscapers who use mowing equipment in areas where rabbits are prolific, as well as with rabbit and squirrel hunting and skinning.

Dx: 4-fold rise in acute and convalescent IgG and IgM serum titers + Gram stain and culture of clinical specimens (difficult to demonstrate the organism usually) ± PCR in research setting.

Tx: Depends on the patient's clinical status; mild-to-moderate disease = ciprofloxacin or doxy; moderate-to-severe disease = streptomycin or gentamicin; meningitis = streptomycin or gentamicin + chloramphenicol or doxy.



SCRIPT

Approximately 2–3 weeks after obtaining a new kitten, patient presents with:

- Fever
- Papular lesion on the forearm, present for about a week
- New painful axillary lymphadenopathy

What is the diagnosis?

Diagnosis is **cat-scratch disease**.

Cat-scratch disease is caused by *Bartonella henselae*. *Bartonella* species can cause systemic disease in patients with HIV/AIDS.

Dx: Clinical and of exclusion (exclude other bacterial causes of lymphadenitis, especially atypical mycobacteria and scrofula) + serologic test for *B. henselae* with $\geq 1:64$ titer $\pm$ biopsy of lesions with granulomatous inflammation on pathology and organisms visible on Warthin-Starry stain.

Tx: Self-limited so usually no treatment required and antibiotic use in lymphadenitis is controversial; if prescribing, give azithromycin. Rare cases of dissemination to eye, liver, or CNS should be treated with azithromycin.



SCRIPT

Hiker from Arkansas presents with:

- Fever
- Headache
- Myalgias
- Maculopapular rash that becomes petechial on the wrists and ankles
- ↓ WBC, Hgb, Hct, and Plt
- ↓ Serum Na
- ↑ Serum AST and ALT
- Normal PT and PTT

What is the diagnosis?

Diagnosis is **Rocky Mountain spotted fever**.

Look out for the history of exposure to ticks in endemic areas (southeast and south central U.S., especially) and the features of: Pancytopenia, hyponatremia, characteristic rash without evidence of DIC (normal PT and PTT), and increased transaminases. Not all patients have all of the findings, but this is the classic script. Be cautious not to confuse this petechial rash (which is characteristically on the wrists and ankles) with petechiae/purpura due to DIC in patients with meningococcal sepsis (called "purpura fulminans"). Those patients have classic findings of DIC with increased D-dimer and prolonged PT and PTT. Ehrlichiosis appears very similar to RMSF, except usually without a rash. The other lab findings are nearly identical.

Dx: Clinical. Skin biopsy for immunofluorescence. 4-fold rise in acute and convalescent IgG and IgM serum titers occurs but treatment needs to be immediate.

Tx: Empiric oral or parenteral doxycycline in suspected cases; recognize that no diagnostic tests give immediate answers, so antibiotics should not be withheld awaiting serology or biopsy findings.



SCRIPT

Male patient, who lives on a goat farm, presents 2–3 weeks after assisting with the births of multiple goats with:

- Fever
- Headaches
- Malaise
- Myalgias
- ± Dyspnea and cough
- ± ↑ Serum AST and ALT
- ± CXR: Pulmonary infiltrates

What is the diagnosis?

Diagnosis is **Q fever**.

The history of exposure to birth products from livestock should be your first clue. The organism responsible for disease is *Coxiella burnetii*. Know that Q fever presents with a flu-like prodrome followed by hepatitis, pneumonia, or both. Rare cases of endocarditis occur, so a clinical case could include the livestock history in a patient with culture-negative endocarditis. You might have guessed *Brucella* here, but remember that *Brucella* does not usually cause this rapid febrile response with a definite early hepatitis.

Dx: 4-fold rise in acute and convalescent IgG and IgM serum titers $\pm$ PCR in research settings.

Tx: Usually self-resolves, so no treatment is necessary; moderate-to-severe disease = doxycycline; endocarditis = doxy + hydroxychloroquine x 18 months.



SCRIPT

Hiker from Arkansas presents with:

- Fever
- Headache
- Myalgias
- ↓ WBC, Hgb, Hct, and Plt
- ↓ Serum Na
- ↑ AST and ALT

What is the diagnosis?

Diagnosis is **ehrlichiosis**.

Think about *Ehrlichia* as "Rocky Mountain spotless fever," because of its similarity to RMSF but only 1/3 have a rash. In 1993, an outbreak of *Ehrlichia* occurred in a group of Tennessee golfers who lived in a retirement community near a wooded area with deer. More cases were seen in golfers who spent a lot of their time retrieving lost balls in the rough.

Dx: Intracytoplasmic inclusions in blood WBCs. For confirmation after treatment, 4-fold rise in acute and convalescent IgG and IgM serum titers at least 2 weeks apart. PCR in research settings.

Tx: Empiric doxycycline; antibiotics should not await findings of laboratory tests.

SCRIPT

Adolescent presents with the following:

- Chronic anterior cervical lymph node swelling that eventually develops fluctuance $\pm$ draining sinus tract
- TB skin test: > 15 mm induration

What is the diagnosis?

Diagnosis is **TB lymphadenitis (scrofula)**.

Lymphadenitis due to *M. tuberculosis* is sometimes called "scrofula." Be careful that you don't confuse that with infection with the atypical mycobacterium, *M. scrofulaceum*—which often causes lymphadenitis, as well. But only the *M. tuberculosis* clinical presentation is termed "scrofula," in spite of the similarity of the species name. Culture is necessary to distinguish between lymphadenitis due to TB and atypical TB, but one clue in this script is the induration of the TB skin test. Usually, atypical *Mycobacteria* do not cause positive TB skin tests, or they cause only slight induration (~ 5 mm). Be aware that the same presentation in a patient with HIV/AIDS would more likely be associated with disseminated disease.

Dx: Excisional node biopsy with AFB smears, mycobacterial culture, and pathology (shows caseating granulomas) + CXR.

Tx: 4-drug antituberculous therapy (rifampin, INH, ethambutol, pyrazinamide) x 2 months, then 2 drugs x 4 months; duration 6–9 months.



SCRIPT

Patient with known SLE on chronic prednisone presents with prolonged:

- Fevers
- Dyspnea
- Productive cough
- Night sweats and weight loss
- CXR: Multiple nodules and interstitial infiltrates
- TB skin test: No induration
- Sputum Gram stain: Filamentous, branching gram-positive rods that are partially acid-fast
- Head CT with contrast: Singular mass lesion

What is the diagnosis?

Diagnosis is **disseminated nocardiosis**.

Even though this patient had no symptoms of CNS infection, a mass was found. This is not uncommon in *Nocardia* in immunocompromised patients, so always do head CT of patients with pulmonary *Nocardia*. Also, always consider *Nocardia* as a diagnosis when a patient presents with a pulmonary and brain process. Although *Nocardia* presents more commonly in immunosuppressed patients, it also occurs in immunocompetent patients. So think about it in any patient with chronic pneumonia. "Filamentous, branching, gram-positive rods" is the key morphology to remember. It is also seen with actinomycosis.

Dx: Gram stain and culture of clinical specimens; resistance testing is important.

Tx: Based on susceptibility results; TMP/SMX, ceftriaxone, cefotaxime, imipenem, or amikacin.



SCRIPT

Known diabetic with poor dental hygiene presents with:

- Chronic, painless swelling at the angle of the jaw that develops a draining sinus, extruding yellow, gritty material
- Gram stain of gritty material: Branching, filamentous, gram-positive rods

What is the diagnosis?

Diagnosis is **cervicofacial actinomycosis** (“lumpy jaw”).

When the presentation is early, before any fistulae form, and before any sulfur granules (the gritty yellow exudate) are extruded, the diagnosis is sometimes tough and is often misdiagnosed as a cellulitis. The disease is called lumpy jaw for a reason; always consider it in anybody who develops a lump in the jaw area. Pelvic and intraabdominal actinomycosis are associated with the use of IUDs, so think about actino in any IUD-related abdominopelvic presentation.

Dx: Gram stain and culture of clinical specimens + biopsies (inflammation, fibrosis, and sulfur granules). *Actinomyces* can be differentiated from *Nocardia* because *Nocardia* is partially acid-fast and an aerobe, whereas *Actinomyces* is not acid-fast and is an anaerobe.

Tx: High-dose oral penicillin x 2–6 months.



SCRIPT

2 weeks after visiting in-laws (exotic bird breeders), a patient presents with:

- Fever
- Headache
- Dry cough
- $\pm$ Splenomegaly
- Normal WBC count with differential $> 80\%$ neutrophils
- CXR bilateral lower lobe infiltrates
- $\pm \uparrow$ Serum AST and ALT
- $\pm \downarrow$ Serum Na
- $\uparrow$ ESR and CRP

What is the diagnosis?

Diagnosis is **psittacosis**.

When you see a bird exposure, think about 2 different clinical illnesses: Psittacosis and hypersensitivity pneumonitis. Psittacosis is an acute illness after a significant bird exposure. It is associated with the features in this script. Hypersensitivity pneumonitis presents as recurrent pneumonias upon exposure to the antigen (symptoms occur after cleaning out the bird cage). Note the difference between acute illness and repeated pneumonias—very, very important epidemiologic differences to help you determine the diagnosis. Note that splenomegaly occurs in only about 10% of patients, although it is commonly included in exam clinical scenarios.

Dx: 4-fold rise in acute and convalescent IgG and IgM serum titers.

Tx: Empiric doxycycline.

SCRIPT

Sexually active patient presents with:

- Fever
- Headache
- Myalgias
- Scattered lymphadenopathy
- Disseminated maculopapular rash, including the palms and soles
± wet-appearing, whitish plaques on the mouth and/or genital mucosa

What is the diagnosis?

Diagnosis is **secondary syphilis**.

If the script hadn't used the words "palms and soles," you might have guessed a variety of answers, including influenza, mono, RMSF, meningococemia, primary HIV infection, etc. Questions about syphilis might describe the rash on the palms and soles as "nickel-and-dime lesions." The whitish plaques are condyloma lata lesions that are manifestations of secondary syphilis.

Dx: Clinical + RPR or VDRL for screening + MHA-TP or FTA-ABS for confirmation of positive screening test + darkfield microscopy of mucosal scrapings; lumbar puncture if serum RPR titer is $\geq 1:32$.

Tx: Single IM injection of PCN G; alternatives for those with PCN allergy include doxy, macrolides, or ceftriaxone.



SCRIPT

Middle-aged or older patient presents with:

- Personality changes, including inappropriate moods, agitation, irritability
- Depressed affect
- Decreased reflexes
- Bilateral small pupils that accommodate but do not react to light
- Clouded sensorium
- Forgetfulness and impaired judgment
- Aphasia
- Negative HIV test
- Positive serum RPR and MHA-TP
- CSF: > 5 leukocytes/hpf, mild ↑ protein, negative VDRL

What is the diagnosis?

Diagnosis is **tertiary syphilis**.

PARESIS is a mnemonic for the manifestations of tertiary, parenchymatous neurosyphilis: **P**ersonality, **A**ffect, **R**eflexes, **E**yes, **S**ensorium, **I**ntellect, **S**peech. CSF leukocytosis and increased protein are findings consistent with neurosyphilis, and not all cases have positive CSF VDRL (up to 30% do not). Tertiary syphilis does not have to involve the brain: Look out for cases of aortitis with AV regurgitation and aortic aneurysm formation and gummatous disease.

Dx: Serum RPR or VDRL for screening + MHA-TP or FTA-ABS for confirmation of positive screening test + CSF cell count, protein, glucose, and VDRL.

Tx: Intravenous PCN G x 10–14 days.



SCRIPT

Previously healthy patient returns from Hawaii after participating in fresh-water kayaking and swimming in local waterfalls. 1 week later, he develops:

- Fever and headache
- Myalgias
- Conjunctival suffusion
- $\pm$ Abdominal pain and hepatosplenomegaly
- Variable WBC and normal Plt
- $\downarrow$ Serum Na
- $\pm$ $\uparrow$ Serum AST, ALT, and CPK
- $\pm$ CSF: $\uparrow$ Leukocytes (differential: $\uparrow$ Polys or lymphocytes)
- Severe cases: $\uparrow$ T. bili and $\downarrow$ albumin

What is the diagnosis?

Diagnosis is **leptospirosis**.

The big clue is the buzz phrase "conjunctival suffusion." Few infectious diseases do this, and always consider lepto when you see it, or see the buzz phrase. The association with Hawaii is important, as that state has the most number of lepto cases/year. Also, think about lepto if the case presents meningitis in a triathlete who swam in open water; many recent outbreaks have occurred in this population.

Dx: Culture of clinical specimens (blood, urine, CSF) + 4-fold rise in acute and convalescent IgG and IgM serum titers.

Tx: Parenteral doxycycline, ceftriaxone, or cefotaxime.



SCRIPT

1 month after a patient returns from visiting the northeast U.S., she presents with:

- $\pm$ Fever and malaise
- Single, painless, macular skin lesion that develops a central clearing and resembles a target

What is the diagnosis?

Diagnosis is **erythema migrans**.

The history of exposure to an area endemic for Lyme disease and the large painless target lesion are diagnostic.

Dx: Clinical; no tests should be done at this time when a patient presents with the characteristic rash and exposure to an endemic area. Serology is commonly falsely negative at this time.

Tx: Oral doxycycline, amoxicillin, or cefuroxime.



SCRIPT

Several months after a trip to Martha's Vineyard, a patient presents with:

- Chronic (weeks to months), mildly painful, very swollen knee
- Large knee effusion
- +Serum RPR
- +*B. burgdorferi* IgG and IgM ELISA
- +*B. burgdorferi* Western blot
- Arthrocentesis: WBC < 25,000/mm³

What is the diagnosis?

Diagnosis is **Lyme arthritis**.

Positive antibody tests, in and of themselves, are not enough to make a diagnosis of Lyme disease; but in the appropriate clinical context, you would order a Western blot test to confirm the ELISA results. Remember that Lyme can be associated with a false-positive RPR.

Dx: Two-stage Lyme testing (IgM and IgG ELISA or IFA screening with confirmation of positive tests using Western blot) $\pm$ PCR testing for *B. burgdorferi* on joint fluid.

Tx: Oral doxycycline or amoxicillin x 30 days; some patients with persistent symptoms require parenteral treatment with 30 days of ceftriaxone. After 30 days of parenteral treatment with ceftriaxone, symptoms should be managed with analgesics only.

SCRIPT

Injection drug user, who mixes his heroin with prepackaged lemon juice from the grocery store, presents with:

- Fevers
- Decreased vision
- Blood cultures: Yeast

What is the diagnosis?

Diagnosis is ***Candida* fungemia and endophthalmitis**.

Contaminated diluents have been associated with fungemia in injection drug users, especially the premade lemon juice available at the grocery store. Be on the lookout for *Candida* fungemia in the patient with a history of a long-term indwelling central venous catheter, especially if also receiving TPN. Eye disease is a frequent complication of fungemia, and all patients with *Candida* fungemia should have funduscopy because eye disease affects the duration and type of treatment with antifungal drugs.

Dx: Clinical, including ophthalmologic exam + blood cultures $\pm$ fungal stain and cultures of vitreous $\pm$ β -d-glucan assay (most helpful in intraabdominal candidal infections that are associated with negative blood cultures).

Tx: Depends on species of *Candida* that is isolated and whether the species is susceptible to fluconazole; also depends on extent of ocular involvement. Agents used include amphotericin B, liposomal amphotericin, fluconazole, or voriconazole $\pm$ vitrectomy.

SCRIPT

Known lupus patient with h/o chronic prednisone use presents with weeks of:

- Intermittent fevers
- Headaches
- Confusion
- CSF: Opening pressure > 200 mm H₂O, 20-200 leukocytes/hpf (↑ monocytes), ↑ protein, ↓ glucose; Gram stain: No organisms

What is the diagnosis?

Diagnosis is **cryptococcal meningitis**.

The big clues are the history of chronic steroid use and the very high opening pressure in the CSF. Crypto is notorious for increasing CSF pressure in this manner. If you're really on the ball (or are an ID doc), you might protest and say you would worry about TB—and I agree.

Dx: Serum crypto antigen + CSF opening pressure, crypto antigen, cell count, protein, glucose, and fungal culture.

Tx: Amphotericin B + flucytosine as induction, and then switch to fluconazole + keep ICP < 20 cm with repeated lumbar taps or insertion of ventriculoperitoneal shunt.



SCRIPT

One week after returning from a road trip through Arizona and New Mexico, a previously healthy, female patient presents with:

- Fatigue
- Fevers
- Cough
- Arthralgias
- Tender nodules across both shins

What is the diagnosis?

Diagnosis is **primary *Coccidioides* infection**.

The clues here: Arizona and description of erythema nodosum. This presentation is "Valley Fever."

Dx: Fungal stains and culture of clinical specimens + IgG and IgM serum immunoassays.

Tx: No treatment required for mild disease; severe illness, immunosuppression, and pregnancy should be treated with itraconazole or fluconazole.



SCRIPT

10 days after returning from a vacation to Austin, Texas to watch the bats emerge from under the bridges, patient develops:

- Fever and chills
- Headache
- Cough
- Pulmonary rales
- CXR: Hilar adenopathy and patchy interstitial infiltrates

What is the diagnosis?

Diagnosis is **pulmonary histoplasmosis**.

The exposure history is the key here. Think about histo with any of the following exposures: Farm buildings, caves, bird-roosting locations, bat guano, and "spelunking" (cave exploration) with exposure to the southeast and south central U.S.

Dx: The sensitivity of the different tests for histo vary depending on the presentation of disease.

The antigen tests are useful in patients with very severe disease. Diagnose pulmonary histo with fungal stains and cultures of sputum $\pm$ histo antigen on urine, blood, or bronchoalveolar lavage specimens in sick individuals + serum complement fixation antibody test.

Tx: Lipid amphotericin B preparations for very severe disease; itraconazole for less severe disease.



SCRIPT

Hunter from Illinois presents with:

- Chronic cough productive of purulent sputum
- Weight loss
- CXR: Several nodular lesions

What is the diagnosis?

Diagnosis is **blastomycosis**.

In this script, we left out the yeasts. The chronicity and the association with hunting and the Midwest are good clues to the diagnosis.

Dx: Identification of the yeast in clinical specimens + culture; serologic tests are not reliable.

Tx: Itraconazole or amphotericin B (for severe infections and any involving the CNS).



SCRIPT

Injection drug user who “skin pops” heroin presents with:

- Trismus
- Irritability and anxiety
- ↑ HR
- Labile BP
- Tonic muscle contractions, precipitated by light and loud noises
- Several erythematous and tender subcutaneous nodules at sites of injection

What is the diagnosis?

Diagnosis is **tetanus**.

We tend to think of tetanus as a disease of middle-aged men who step on nails at construction sites and have outdated tetanus vaccinations. But remember this association between skin popping of heroin and tetanus. Several outbreaks were noted in the U.S. and United Kingdom in the late 90s through 2005 due to a contaminated drug. Autonomic instability and tonic muscle contractions triggered by loud noises and light are key features of tetanus.

Dx: Clinical.

Tx: ICU admission, benzodiazepines + neuromuscular blockers + careful attention to autonomic instability) + wound debridement + metronidazole + tetanus immune globulin + tetanus immunization (Td or Tdap).

SCRIPT

Sexually active patient presents with:

- Painless, small, firm, genital ulceration that remains present for 2–3 weeks

What is the diagnosis?

Diagnosis is **primary syphilis**.

You absolutely must know all about genital ulcerations for any Board exam. It is safe to associate any painless genital ulcer with primary syphilis. Painful ulcers are usually herpes or chancroid, the former occurs after clustered vesicles rupture and the latter is typically large and single. Painless genital ulcer in the U.S. = syphilis.

Dx: Clinical, darkfield microscopy of scrapings from chancre, or + RPR or VDRL for screening + MHA-TP or FTA-ABS for confirmation of positive screening test; lumbar puncture if serum RPR titer is $\geq 1:32$.

Tx: Single IM injection of PCN G; alternatives for those with PCN allergy include doxy, macrolides, or ceftriaxone.



SCRIPT

Gardener presents with:

- Chronic papulonodular skin lesion on the hand or forearm
- Smaller papular lesions in proximal lymph channels

What is the diagnosis?

Diagnosis is **sporotrichosis**.

Like *Bartonella*, this diagnosis, in this current form, is probably too easy for a Board exam. However, remember that alcoholics, diabetics, and patients with HIV/AIDS may present with disseminated sporo that presents as hypotension and pneumonia.

Dx: Fungal stains and culture on clinical specimens (aspirates, tissue biopsies, body fluids) $\pm$ biopsy (may show small number of fungal organisms with special stains).

Tx depends on extent of disease: For disease limited to the lymph system and skin = oral itraconazole; severe disease = lipid amphotericin B then transition to itraconazole after improvement.



SCRIPT

Diabetic with history of frequent episodes of ketoacidosis presents with:

- Fever
- Confusion
- High anion gap metabolic acidosis
- ↑ Blood glucoses
- Recent history of chronic, purulent, nasal discharge
- A painless black lesion in the anterior nares

What is the diagnosis?

Diagnosis is **zygomycosis**.

Different genera of zygomycetes can cause the same clinical presentation, so this presentation is no longer termed "mucormycosis" since *Mucor* is only one of the zygomycetes (*Rhizopus* is another). The recent terminology is now "zygomycosis." The most common presentation is sinusitis in an uncontrolled diabetic.

Dx: Fungal stains and cultures of clinical specimens (tissue biopsies, bronchoalveolar lavage fluid, sinus specimens).

Tx: Aggressive supportive care + surgical debridement + lipid amphotericin B.

SCRIPT

Patient with HIV/AIDS and a CD4 count $< 100/\mu\text{L}$ presents with:

- Headache
- Vomiting
- Seizure
- Contrast head CT: Multiple ring-enhancing lesions and generalized edema
- Serum toxo IgM negative, IgG positive

What is the diagnosis?

Diagnosis is **cerebral toxoplasmosis**.

Remember that CNS toxo is usually a reactivation disease, so patients will usually be positive for anti-toxo IgG. But not always! If the patient has ring-enhancing brain lesions and immunosuppression (and no other obvious diagnosis), you can empirically diagnose toxo even if the serum IgG is negative. Remember that herpes encephalitis and brain abscesses usually result in only a single lesion, but toxo will present with multiple lesions.

Dx: Brain imaging + IgM and IgG toxo antibodies ± brain biopsy (shows organisms on special stains) ± CSF for PCR at research institutions.

Tx: Pyrimethamine + sulfadiazine + leucovorin.



SCRIPT

Several patients who swim at the same local swimming pool develop:

- Acute, self-resolving, watery diarrhea
- Crampy abdominal pain
- Stool O&P: No ova or parasites
- Stool modified acid-fast: 4–6 micrometer pink cysts

What is the diagnosis?

Diagnosis is ***Cryptosporidium***.

The size of *Cryptosporidium* cysts are 4–6 micrometers on modified acid-fast stain. Patients with HIV/AIDS can have protracted diarrhea, weight loss, and biliary tract disease. But, immunocompetent patients who are exposed via contaminated water, such as in swimming pools, have self-limited disease.

Dx: Visualization of oocysts in clinical specimens (stool, tissue).

Tx: Treatment not necessary in immunocompetent hosts; antiretroviral treatment for HIV/AIDS patients. Nitazoxanide if requires therapy. Avoid public swimming for 2 weeks after resolution of diarrhea.

SCRIPT

2 weeks after returning from a missionary trip to Cameroon, Africa patient presents with:

- Fevers and chills
- Malaise
- Headaches
- Nonspecific abdominal pain
- Vomiting
- Splenomegaly
- ↓ Hgb, Hct, and Plt
- ↑ Serum AST, ALT, and T. bili
- ± ↑ BUN and creatinine
- Thin smears: Banana gametocytes

What is the diagnosis?

Diagnosis is **falciparum malaria**.

Any patient who returns from a malaria-endemic area with fevers and splenomegaly should be considered to have malaria until proven otherwise. This case also includes the buzz phrase "banana gametocyte." When you see that, the diagnosis is *P. falciparum* malaria. Remember, malaria does not characteristically have a rash!

Dx: Thick and thin blood smears stained with Giemsa for identification of parasites (banana gametocytes and ring forms in *P. falciparum*) ± various rapid diagnostic test.

Tx depends on severity of disease and area of travel: Chloroquine-sensitive mild disease = chloroquine; chloroquine-resistant or unknown = artemisinin combination (artesunate or artemether + amodiaquine, atovaquone-proguanil, lumefantrine, clinda, doxy, and others), atovaquone-proguanil, quinine plus pyrimethamine-sulfadoxine, doxy, or clinda, or mefloquine and doxy.



SCRIPT

Hunter from the Midwest presents with:

- Fever
- Headaches
- Myalgias
- Splenomegaly
- Mild jaundice
- ↓ Hgb, Hct, and Plt
- ↑ Indirect bili, reticulocyte count, and ↓ haptoglobin
- ↑ Serum AST, ALT, alkaline phosphatase, and LDH
- Thin smears: Maltese cross merozoites

What is the diagnosis?

Diagnosis is **babesiosis**.

Remember that *Babesia* is endemic in the Midwest and northern U.S. The “Maltese cross” in peripheral blood helps you make the specific diagnosis. This disease may be seen coexisting with Lyme infection or ehrlichiosis.

Dx: Thin blood smears stained with Giemsa to visualize parasites or PCR testing on peripheral blood in patients with negative thin smears $\pm$ IgG and IgM serum titer $\geq 1:64$.

Tx: Only symptomatic patients and asymptomatic patients with prolonged parasitemia visible in blood smears for several months need treatment. Treat with atovaquone + azithromycin or quinine + clindamycin.



SCRIPT

Gay male presents with:

- Chronic, "smelly" stools that float
- Flatulence
- "Sulfuric belching"
- Weight loss
- Negative stool O&P evaluation

What is the diagnosis?

Diagnosis is **giardiasis**.

The clinical scenario could include a hiker who drinks mountain water. Don't let a negative O&P evaluation dissuade you from the diagnosis of *Giardia* because only ~ 50% of specimens are positive. Sulfuric belching is always a dead giveaway for *Giardia*—not much else does that. Remember the groups that are at increased risk: Men who have sex with men, the immunosuppressed, and those who drink mountain water.

Dx: Stool ova and parasite evaluation + stool *Giardia* antigen ± duodenal biopsy.

Tx: Treat only symptomatic patients. Choices include metronidazole, tinidazole, and nitazoxanide.

SCRIPT

Adult male Mexican immigrant presents with 1–2 week h/o:

- RUQ pain
- Fevers
- Tender hepatomegaly
- ↑ WBC with normal differential
- ↑ Serum alkaline phosphatase ± ↑ AST and ALT
- Liver U/S: Single large lesion in right hepatic lobe with “anchovy paste” aspirate that shows no organisms on Gram stain
- Stool O&P: No organisms

What is the diagnosis?

Diagnosis is **amebic liver abscess**.

The “anchovy paste” description and no organisms on Gram stain help you differentiate the amebic liver abscess from a pyogenic abscess. Most patients with amebic liver abscess will not show amebae in their stools. Look for a history of travel to areas where amebiasis is endemic.

Dx: Liver imaging + *E. histolytica* antibody tests ± aspiration of the cyst with H&E stain and culture of aspirate.

Tx: Metronidazole x 10 days then follow up with paromomycin, diiodohydroxyquin, or diloxanide to treat disease in the intestinal lumen (even if stool studies never show the organism).



SCRIPT

Nursing home patient develops:

- Perpetual scratching buttocks
- Multiple perianal excoriations
- Bean-shaped eggs: "Scotch tape test"

What is the diagnosis?

Diagnosis is **pinworms** (*Enterobius vermicularis*).

The scotch tape test is only used to diagnose pinworms; you can safely make that association.

Remember that pinworms are not diagnosed on O&P exams of the stool because eggs aren't shed in the stool.

Dx: Scotch tape test (scotch tape pressed against perianal skin, then tape pressed onto slide and viewed under the microscope).

Tx: Albendazole.



SCRIPT

1 week after eating meat from a local bear hunter, several patients develop abdominal pain and diarrhea that eventually progress to:

- Myalgias, ocular pain, and muscle swelling
- Lower extremity edema
- Conjunctival and subungual hemorrhages
- Periorbital edema
- ↑ WBC with differential: ↑ Eosinophilia
- ↑ Serum CPK

What is the diagnosis?

Diagnosis is **trichinellosis**.

You probably associate *T. spiralis* more with undercooked pork, which is also true. However, recent outbreaks have been associated with uncooked bear meat. The eosinophilia gives this diagnosis away and helps you exclude simple myositis as the cause.

Dx: *T. spiralis* antibody test ~ 3 weeks after infection + muscle biopsy (shows larvae).

Tx: Treat only symptomatic patients with albendazole.



SCRIPT

Adult Mexican immigrant presents with:

- New seizure
- Normal CBC and chemistry
- Contrast CT head: Multiple lesions; some enhance, some slightly enhance and have surrounding edema, and some are calcified
- MRI brain: Several scolices inside cystic lesions

What is the diagnosis?

Diagnosis is **neurocysticercosis**.

MRI is the only test that shows the scolices, and this finding gives you the definitive diagnosis. No other diagnosis gives you these different types of imaging findings (variations in contrast and calcification of lesions).

Dx: Clinical and of exclusion + MRI $\pm$ serum anticysticercal antibodies or cysticercal antigen testing + funduscopic exam (can visualize parasites directly) $\pm$ brain biopsy (not usually needed).

Tx is variable: Antiepileptic drugs for patients with seizures; albendazole + prednisone for patients with a single cyst or multiple cysts without edema. If imaging shows only calcified lesions, no antiparasitic drugs are recommended. Surgery is performed in patients with cerebral edema or hydrocephalus.



SCRIPT

Previously healthy adolescent presents with the acute onset of:

- Fever
- Seizure
- Confusion
- CSF: ↑ Leukocytes (↑ lymphs), ↑ RBCs, ↑ protein
- MRI: Temporal lobe enhancement

What is the diagnosis?

Diagnosis is **herpes simplex encephalitis**.

The big clues to this case are: Bloody CSF and temporal lobe enhancement; both are cardinal features of HSV encephalitis. Other forms of encephalitis uncommonly present with the hemorrhagic component and the temporal lobe involvement.

Dx: Brain imaging + CSF for cell count, protein, glucose, HSV DNA by PCR (gold standard test), and viral culture ± brain biopsy for atypical cases.

Tx: Intravenous acyclovir x 14–21 days.



SCRIPT

Adolescent patient presents with fever, malaise, sore throat, and disseminated pruritic, vesicular rash that progresses to:

- Cough and dyspnea
- ↓ BP
- Hypoxemia
- CXR: Diffuse bilateral infiltrates

What is the diagnosis?

Diagnosis is **varicella pneumonia**.

The clue is the development of pneumonia in the setting of an itchy vesicular rash.

Dx: PCR on clinical specimens (skin lesions) + viral culture on clinical specimens (skin lesions, bronchoalveolar lavage fluid) + serum varicella-zoster virus antibodies.

Tx: Oral acyclovir can be used in adults with mild disease; severe disease should be treated with high-dose intravenous acyclovir (10 mg/kg q 8 hours) + supportive care.

SCRIPT

Middle-aged patient presents after several days of burning and tingling of the skin on his chest with:

- Erythematous, vesicular rash that is localized to a linear segment of the chest and stops at the midline

What is the diagnosis?

Diagnosis is **varicella zoster**.

Don't forget that if the zoster involves the tip of the nose, then the virus is in the first division of the trigeminal nerve, and the patient is at risk for zoster ophthalmicus, which can threaten vision. Slit-lamp exam should be performed. The chest and back are most common areas for zoster.

Dx: PCR on clinical specimens (skin lesions) + viral culture on clinical specimens (skin lesions).

Tx: Antiviral therapy (oral acyclovir, famciclovir, or valacyclovir), especially in all patients over 50 years; younger patients do not necessarily need treatment, especially if they present after 72 hours of symptoms + analgesics.

SCRIPT

Adolescent patient presents with:

- Fever
- Pharyngeal pain $\pm$ tonsillar exudates
- Marked fatigue
- Anterior cervical lymphadenopathy
- $\pm$ Splenomegaly
- $\uparrow$ WBC (differential: $\uparrow$ Lymphocytes)
- Peripheral smear: Atypical lymphocytes
- $\uparrow$ Serum AST and ALT
- Heterophile antibody: Positive

What is the diagnosis? What is it due to?

Diagnosis is **infectious mononucleosis** due to **Epstein-Barr infection**.

Always think EBV mono when you see increased AST and ALT in a patient with exudative pharyngitis. Not too many other illnesses do this (Q fever does, but the case should have animal exposures). About 10% get a non-itchy maculopapular rash that lasts for ~1 week. Patients taking ampicillin or amoxicillin are very likely to get a morbilliform (measles-like) rash. It's fairly easy to distinguish EBV mono from GAS pharyngitis (no splenomegaly or transaminase elevation in the latter), but CMV is more difficult (less severe sore throat, but other manifestations are same; distinguished by absence of heterophile antibody and +CMV IgM serology). Primary HIV infection can look very similar to mono but would also be heterophile negative.

Dx: Clinical and of exclusion + heterophile antibody test ("monospot") ± EBV antibodies.

Tx: Supportive; avoid contact sports until ~ 3 weeks after improvement—or even longer for aggressive contact sports.



SCRIPT

Non-vaccinated adolescent presents with:

- Fevers
- Cough
- Runny nose
- Conjunctivitis
- Bluish-white spots on the buccal mucosa
- Diffuse, maculopapular rash, beginning on the face and moving downward

What is the diagnosis?

Diagnosis is **measles**.

Coryza is another term for the feelings of a congested and runny nose. The bluish-white spots are "Koplik spots," but you should definitely know what these are by description and not in name only.

Cough, coryza, conjunctivitis, Koplik spots = measles.

Dx: 4-fold rise in acute and convalescent IgG and IgM serum titers + viral culture of clinical specimens.

Tx: Supportive + measles vaccination (should have at least 2 doses).



SCRIPT

Otherwise healthy patient develops the following symptoms in the winter:

- High spiking fevers > 5 days
- Severe myalgias and pain when moving the eyes
- Cough and rhinorrhea

What is the diagnosis?

Diagnosis is **influenza**.

This script could be one of many infections, but hopefully you guessed influenza first. During the influenza season, a high fever and cough have an 80% positive predictive value for diagnosing influenza, which is similar to rapid antigen testing. The persistent high fevers > 5 days is unusual for other respiratory viruses, and the ocular myalgias are seen often with influenza.

Dx: Clinical. Rapid antigen test + viral culture of clinical specimens ± PCR testing on clinical specimens only if at risk for or with severe disease.

Tx: Supportive ± oseltamivir or zanamivir in patients with severe illness or those at risk for complications.



SCRIPT

Sometime after exposure to a flying bat in his camping trailer and a week of headaches and flu-like symptoms, a man presents with:

- Anxiety and irritability
- Fever
- Refusal to drink water
- Excessive salivation
- Pharyngeal spasms in response to seeing water or feeling cold air

What is the diagnosis?

Diagnosis is **rabies**.

Be aware of the association of rabies with bat exposure, even if no bite was witnessed.

Dx: Immunofluorescence staining of tissue biopsy specimens + viral culture of clinical specimens (CSF, saliva, biopsies) + brain biopsy (usually postmortem).

Tx: Immediate vaccination and administration of human rabies immune globulin.



SCRIPT

College student presents with:

- Fever
- Malaise
- Headache
- Bilateral parotid swelling

What is the diagnosis?

Diagnosis is **mumps**.

Remember that in spite of widespread vaccination, mumps still occurs and has been seen in outbreaks at colleges, summer camps, and in military barracks.

Dx: 4-fold rise in acute and convalescent IgG and IgM serum titers + viral culture or PCR testing on clinical specimen.

Tx: Symptomatic.



SCRIPT

60-year-old East Texas patient sits for hours in his front yard in the summertime. He presents with fever, severe headache, and myalgias, then develops:

- Confusion
- Tremors of eyelids, tongue, lips, and extremities
- Myoclonus
- $\pm$ Unilateral facial weakness
- $\uparrow$ Serum AST, ALT, and CPK
- $\downarrow$ Serum Na
- CSF: $\uparrow$ Leukocytes (< 200 cells/mm³) with $\uparrow$ monocytes, mild $\uparrow$ protein, normal glucose; Gram stain: No organisms; –HSV PCR
- MRI: No abnormalities

What is the diagnosis?

Diagnosis is **arbovirus encephalitis**.

This case would most likely be St. Louis encephalitis, but most of the etiologies have similar presentations. Think about arbovirus encephalitis when you see altered mental status with tremors and clonus. The epidemiologic clue is that the patient sits outside in the summer where mosquitos linger.

Dx: Clinical and of exclusion (especially exclude HSV with CSF PCR) + CSF opening pressure, cell count, protein, glucose, viral culture, PCR for arboviruses (gold standard test) + serum and CSF for arboviral antibodies.

Tx: Supportive.



SCRIPT

2 weeks after cleaning a warehouse in New Mexico that contained rodent droppings, previously healthy patient presents with fever, malaise, myalgias, headaches, and decreased platelets, and rapidly develops:

- Progressive bilateral pulmonary interstitial edema, leading to hypoxic respiratory failure
- ↑ Serum AST, ALT, LDH, and lactate
- Prolonged PT and PTT with ↑ D-dimer, fibrin degradation products, and ↓ fibrinogen

What is the diagnosis?

Diagnosis is **hantavirus pulmonary syndrome**.

Always think about hantavirus when you see rodents in a clinical history. This is a very rapidly progressive syndrome, so patients with rodent exposure who develop cough should be taken very seriously.

Sometimes the rodent history is hard to get (or is left out of an exam question), so think about hantavirus in a patient with a severe pneumonia and exposure to the desert southwest.

Dx: 4-fold rise in acute and convalescent IgG and IgM serum titers (usually antibodies are present when patient is symptomatic) + PCR on clinical specimens (peripheral blood, serum).

Tx: Supportive. The use of ribavirin is controversial.



SCRIPT

Patient with HIV/AIDS and a CD4 count $< 100/\mu\text{L}$ presents with progressive:

- Mild confusion
- Right-sided motor weakness
- Ataxia
- Trouble initiating speech
- MRI: Diffuse white matter demyelination, especially in periventricular and subcortical areas, without edema or contrast enhancement
- CSF: + For JC virus by PCR

What is the diagnosis?

Diagnosis is **progressive multifocal leukoencephalopathy**.

Know that some patients with a PML-type clinical picture will have a negative CSF PCR for JC virus. If the clinical features of PML are present in an immunosuppressed host, then don't be afraid to make that diagnosis. Remember the more recent association between PML and the use of immunosuppressant medications, such as rituximab, efalizumab, fludarabine, and chronic corticosteroids.

Dx: CSF for opening pressure, cell count, glucose, protein, JC virus DNA by PCR $\pm$ brain biopsy.

Tx: Antiretroviral therapy to affect immune reconstitution.



SCRIPT

Patient with HIV/AIDS and CD4 count $< 100/\mu\text{L}$ presents with:

- Fevers
- Profuse watery diarrhea
- Weight loss
- Abdominal pain
- $\downarrow$ Hgb and Hct
- $\uparrow$ Serum alkaline phosphatase
- Blood cultures: + Acid-fast bacilli

What is the diagnosis?

Diagnosis is **systemic MAC infection**.

Many things cause diarrhea in severely immunodeficient patients, but the script helps you by telling you that acid-fast organisms are growing in the blood. You might have guessed disseminated tuberculosis, which is reasonable, but disseminated MAC is more often associated with marked diarrhea.

Dx: Acid-fast stains and cultures of clinical specimens (blood, stool, marrow, tissue biopsy).

Tx: Clarithromycin or azithromycin + ethambutol ± rifabutin.

SCRIPT

Patient with h/o dental abscess presents with:

- Several weeks of chronic, unrelenting headaches, unrelieved by analgesics
- Difficulty focusing on tasks
- Intermittent drowsiness
- Contrast CT brain: Frontal ring-enhancing lesion

What is the diagnosis?

Diagnosis is **pyogenic brain abscess**.

The history of the dental work is what gives you the diagnosis in this case. Organisms that seed the blood from the mouth and ultimately cause disease in the brain more often do so in the frontal lobes. The history could include some kind of trauma that resulted in seeding of the brain or a history of sinusitis that spread directly into the cerebral cortex. Recognize that patients with brain abscess do not have meningeal signs, and lumbar punctures frequently are not helpful and may be contraindicated if there is a mass lesion.

Dx: Brain imaging + brain biopsy or stereotactic aspiration with tissue sent for Gram stain, fungal stains, acid-fast stains, and bacterial, fungal, and mycobacterial cultures + histology.

Tx: If suspect oral source = empiric metronidazole + penicillin G, ceftriaxone, or cefotaxime; if suspect bacteremia as source = empiric vancomycin ± metronidazole + penicillin G, ceftriaxone, or cefotaxime; if postoperative neurosurgery = vancomycin + ceftazidime, cefepime, or meropenem; if penetrating trauma = vancomycin + ceftriaxone or cefotaxime. Once cultures and susceptibilities return, regimens can be narrowed.



SCRIPT

3 days after a family chicken dinner, several family members present with:

- Severe crampy abdominal pain
- Profuse watery diarrhea that may become bloody

2 weeks later, one family member develops:

- Self-limited, ascending motor paralysis
- Absent reflexes
- ↑ Protein in the CSF

What was the cause of the diarrhea?

The cause of the diarrhea was ***Campylobacter***.

Contamination of chicken with *Campylobacter* is very common. Most patients are not infected from eating the chicken (it would have to be practically raw to transmit because the organisms are readily killed by heat); rather, they are infected by cross-contamination of cooking utensils or surfaces. It would be impossible to tell if this script was *Salmonella* or *Campylobacter* based on the presenting symptoms of bloody diarrhea. You have to wait for stool culture results to tell the difference. But retrospectively, you can make the diagnosis because of the association between Guillain-Barré and *Campylobacter* infection.

Dx: Stool culture.

Tx: Supportive care for most, since disease is self-limited. For those with severe symptoms or at risk for severe disease, FQ or azithromycin.



SCRIPT

1–2 days after eating a very rare hamburger, a patient presents with:

- Bloody diarrhea
- No fever

What is the diagnosis?

Diagnosis is **Enterohemorrhagic *E. coli***.

Remember that *E. coli* O157:H7 is a type of EHEC. *Campylobacter* and EHEC are 2 causes of bloody diarrhea that may not present with fever (usually *Salmonella* and *Shigella* produce fever). Typically, the exposure history will help you differentiate among these causes. EHEC most often is found in undercooked beef.

Dx: Stool culture.

Tx: Supportive care only.

SCRIPT

Patient with h/o recent antibiotic use develops:

- Watery diarrhea that may become bloody
- Crampy abdominal pain
- $\pm$ Fever
- $\uparrow$ WBC

What is the diagnosis?

Diagnosis is ***Clostridium difficile* colitis**.

Recognize that *C. difficile* can be transmitted to the frail and elderly without any antecedent antibiotic use, so think about it as a cause of diarrhea in any patient population. An alternate clinical presentation is that of fulminant colitis: Patients are very sick with high fevers, abdominal distention, diarrhea, hypovolemia, and lactic acidosis. Toxic megacolon is a potential complication.

Dx: Stool toxin assay $\pm$ stool toxin PCR.

Tx depends on severity of illness: Mild = oral metronidazole; severe disease = vancomycin; ileus = intracolonic vancomycin and IV metronidazole. Recurrences are treated with metronidazole if initial and not severe and vancomycin if severe recurrence. Surgical referral is appropriate with toxic megacolon or acidosis.

SCRIPT

Sexually active patient presents with acute:

- Multiple, painful genital lesions that started as vesicles and became painful ulcerations

What is the diagnosis?

Diagnosis is **herpes genital ulcers**.

Genital vesicles are herpes, herpes, herpes, and nothing other than herpes.

Dx: Viral culture of clinical specimen to confirm serotype that predicts recurrence rate.

Tx: Oral acyclovir, famciclovir, or valacyclovir.

SCRIPT

24–48 hours after visiting the U.S. Gulf Coast and eating raw oysters, patient presents with:

- Profuse, watery diarrhea with flecks of mucus
- $\pm$ Watery vomiting
- $\downarrow$ BP
- No fever

What is the diagnosis?

Diagnosis is **cholera**.

Watery diarrhea with flecks of mucus is often described as "rice water diarrhea" because of the appearance. The diarrhea from cholera is so profuse, it quickly distinguishes itself from other forms of self-limited gastroenteritis. Patients have so many watery stools that they can dehydrate within hours. Abdominal pain and fever are absent.

Dx: Stool for Gram stain and culture ("sheets of curved gram-negative rods").

Tx: Aggressive volume resuscitation and replacement; patients can die within hours, so replacement should begin quickly, followed by antibiotics (doxycycline or quinolones).

SCRIPT

24–48 hours after visiting the U.S. Gulf coast and eating shrimp and crab, a patient presents with:

- Fever
- Bloody diarrhea
- Crampy abdominal pain

What is the diagnosis?

Diagnosis is ***Vibrio parahaemolyticus***.

Vibrio parahaemolyticus is found in the same environment as other vibrios, but it presents differently from cholera, with a more inflammatory picture. Rarely, it can also cause skin and soft tissue infections, like *Vibrio vulnificus*.

Dx: Specialized stool cultures.

Tx: Supportive with aggressive volume resuscitation. Doxycycline or quinolones for severe disease.

SCRIPT

Patient with known hemochromatosis on chelation therapy ingested raw oysters from the Chesapeake Bay, then presented with:

- Fever
- ↓ BP
- Multiple hemorrhagic bullae
- ↓ Plt
- ↑ PT, PTT, fibrin degradation products, and ↓ fibrinogen

What is the diagnosis?

Diagnosis is ***Vibrio vulnificus* septicemia**.

The association of iron overload, raw oysters, bullous skin lesions, and a sepsis syndrome are the keys to recognizing *V. vulnificus*. Most cases are acquired in the Chesapeake Bay or on the U.S. Gulf Coast.

Dx: Bacterial cultures of clinical specimens (blood, wounds).

Tx: Supportive + doxy + either cefotaxime or ceftriaxone + surgical debridement.

SCRIPT

Sexually active female presents with:

- A mucopurulent vaginal discharge
- A friable cervix with mucopurulent discharge at the cervical os
- Wet prep: No organisms

What is the diagnosis?

Diagnosis is **gonorrhea cervicitis**.

Other causes of mucopurulent cervicitis include *Trichomonas* (which would be visible on wet prep) and *Chlamydia*.

Dx: Culture or nucleic acid amplification of clinical specimens.

Tx: Ceftriaxone IM injection 250 mg + either azithromycin 1 gm orally or doxy x 7 days (note, as of 2012, this combination is for treatment of gonorrhea—not for additional treatment of *Chlamydia*, although the regimen also does treat *Chlamydia*). Tests of cure are not recommended.

SCRIPT

Sexually active female at the end of her menstrual cycle presents with:

- Diffuse arthralgias
- Fever
- Tenosynovitis of multiple fingers
- A half-dozen pustular nodular skin lesions

What is the diagnosis?

Diagnosis is **disseminated gonorrhea**.

Key clues to this case include: Recent menstruation, tenosynovitis, and the skin lesions. Alternatively, a scenario could include fever and a purulent arthritis of a large joint, usually the knee. The epidemiology is important in that presentation so that you are able to differentiate the case from other causes of arthritis (e.g., staph).

Dx: Blood cultures + swabs of skin lesions, mucosal surfaces, urethral or cervical regions, and rectal areas inoculated directly onto Thayer-Martin agar.

Tx: Ceftriaxone 1 gm every 24 hours + 1 gm oral azithromycin x 1 dose.

SCRIPT

Elderly male with h/o BPH presents with:

- Scrotal pain
- Tenderness limited to the posterior side of the testis with epididymal induration
- Intact cremasteric reflex
- U/A: ↑ WBCs
- Urine culture: + *E. coli*

What is the diagnosis?

Diagnosis is **infectious epididymitis**.

This diagnosis in an older male is more often caused by enteric Gram-negative rods than by sexually transmitted diseases, which is what you would consider if the patient was < 40 years of age (gonorrhea and *Chlamydia*). This is not torsion because the presentation is subacute, the physical exam does not show pain across the entire testis, and the cremasteric reflex is present.

Dx: Urinalysis + urine culture ± urethral swab of Gram stain and gonorrhea culture and urine for nucleic acid amplification based on risks for STDs.

Tx: Ceftriaxone 250 mg IM + doxy + FQ if 35 years or older or if practices insertive anal intercourse; severe presentation should be referred to urologist immediately.

SCRIPT

Sexually active female presents with:

- Thin vaginal discharge with a “fishy” odor
- Vaginal pH > 4.5
- +Whiff test
- Wet mount: Clue cells

What is the diagnosis?

Diagnosis is **bacterial vaginosis**.

"Clue cells" is your clue to this script, in addition to the high pH fishy odor and +whiff test. *Trichomonas* is the other organism that can cause a thin vaginal discharge, but it is visible on wet prep.

Dx: Vaginal pH > 4.5 + whiff test + wet mount (clue cells).

Tx: Oral or intravaginal metronidazole or clindamycin.



SCRIPT

Sexually active female presents with:

- Thin, yellowish, vaginal discharge
- Dysuria
- Dyspareunia
- Cervix: Punctate hemorrhages
- Vaginal pH > 4.5
- Wet mount: Motile organisms

What is the diagnosis?

Diagnosis is **Trichomonas**.

The thin yellowish discharge might also be described as a "green foul-smelling" discharge, but the green presentation is not common. Trich vaginitis and bacterial vaginosis are the 2 vaginitides that have a pH > 4. A whiff test may also be positive in both.

Dx: Wet mount (shows organisms) ± culture.

Tx: Metronidazole or tinidazole.

SCRIPT

A 40-year-old male cyclist presents with repeated bouts of:

- Fever
- Dysuria
- Perineal aching
- Lower abdominal pain
- Urinary hesitancy
- U/A: ↑ Leukocytes, +nitrites, +leukocyte esterase

What is the diagnosis?

Diagnosis is **acute prostatitis**.

If this case were presented in a female, the diagnosis would definitely be cystitis or pyelo. The most common cause of recurrent UTIs in men is a prostatic focus. Cycling is a risk factor for an inflamed prostate.

Dx: Prostate exam with gentle prostatic massage with Gram stain and culture of prostatic secretions.

Tx can be empiric or based on Gram stain results: Empiric = TMP/SMX or FQ; if GPC chains = amoxicillin or parenteral ampicillin; GPC clusters = cephalexin, dicloxacillin or parenteral cefazolin or nafcillin.



SCRIPT

After 7 days of rhinorrhea, cough, and itchy eyes, patient presents with > 7 more days of:

- Chronic congestion
- Mucopurulent nasal discharge
- Headaches
- $\pm$ Fever

What is the diagnosis?

Diagnosis is **bacterial sinusitis**.

Remember that treatment with antibiotics is generally not considered necessary until the patient has had at least 10 days of nasal symptoms.

Dx: Clinical (at least 7 days of symptoms).

Tx: Treat only if 10 or more days of symptoms or 4 days of symptoms with high fevers = amoxicillin-clavulanic acid or doxycycline. Macrolides and TMP/SMX are no longer recommended.



SCRIPT

Diabetic patient with h/o a chronic foot wound presents with:

- Increased swelling, pain, and foul odor from the foot wound
- Palpable bone with superficial probing

What is the diagnosis?

Diagnosis is **osteomyelitis**.

Recognize that visible bone or bone that is palpable with a probe through a contiguous wound is infected, by definition. Imaging does not help with further defining the diagnosis. Know that a bone biopsy is required to determine proper antimicrobial treatment because wounds are often contaminated with multiple organisms. The only organism from a superficial culture that actually correlates with what is in the bone is *S. aureus*.

Dx: Bone biopsy for Gram stain and culture.

Tx: Initially empiric then narrowed based on culture results and susceptibility testing. Empiric regimens include vancomycin + broad-spectrum beta-lactams; e.g., amp-sulbactam, ertapenem, pip-tazo, and imipenem.



SCRIPT

Patient with h/o AML s/p BMT with h/o prolonged neutropenia has the following:

- Fever on vancomycin, piperacillin-tazobactam, and caspofungin
- Painful, erythematous, nodular skin lesions on the trunk and extremities, some of which develop a necrotic center
- Skin biopsy: Acute branching septate hyphae
- Blood cultures: Conidia

What is the diagnosis?

Diagnosis is **disseminated fusariosis**.

Yep, this is a hard script. A stable but immunosuppressed patient with red nodular skin lesions is most likely to have either disseminated *Candida* or *Fusarium*. "Acute branching septate hyphae" in the biopsy tells you that either *Aspergillus* or *Fusarium* is present. *Aspergillus* does not present with disseminated erythematous nodular skin lesions, nor grow in blood. Thus, an assumption can be made that the hyphae in the biopsy is *Fusarium*. ~ 50% of patients with disseminated fusariosis will have fungemia. *Candida* in the blood is in the form of a yeast, so if this were that organism, the lab would report yeast forms, not conidia. *Fusarium* grows in the blood as a mold, so mold-like features are seen, termed "conidia." It is quite rare for fungi to grow as a mold in the blood; as such, this case should really stick out in your mind! *Fusarium* and *Aspergillus* are the dreaded organisms that can still thrive in immunosuppressed patients who are receiving very broad-spectrum antibiotics and antifungals. If this were *Candida*, it would have to be the species that are not sensitive to caspofungin. The microbiologic specifics of this case might be more than you need to know as an average internist, but these infections are becoming more common.

Dx: Blood cultures + skin biopsy with path and cultures (bacterial and fungal).

Tx: Liposomal amphotericin B ± voriconazole + resolve with neutropenia.



SCRIPT

Patient with h/o acute leukemia, neutropenia, and fever has:

- Persistent fever after empiric treatment with ceftazidime
- Indwelling central venous catheter that appears uninfected
- Blood cultures: Gram-positive cocci

What is the diagnosis?

Diagnosis is **staphylococcal bacteremia**.

The objective of this case is to suspect staphylococcal bacteremia in a patient with febrile neutropenia, a central line, and failure to respond to ceftazidime. Ceftazidime is less active than 1st or 2nd generation cephalosporins against MSSA, and inactive against MRSA. Other common gram-positive cocci (such as strep) are covered reasonably well by ceftazidime. Without specific clues, it is reasonable to assume that this neutropenic patient has one of the more common causes of fever, e.g., the venous catheter.

Dx: Blood cultures.

Tx: Vancomycin, then narrow coverage based on susceptibility test results.

SCRIPT

Young patient with h/o splenectomy develops fever and:

- Rigors and confusion
- ↓ BP and ↑ HR
- Petechiae and purpura
- ↓ WBC, Hgb, Hct, and Plt
- Differential: ↑ Neutrophils and band forms
- Peripheral smear: Dohle bodies and toxic granulations
- ↑ AST, ALT, and serum creatinine
- Prolonged PT and PTT
- ↑ D-dimer and fibrin degradation products with ↓ fibrinogen
- Buffy coat: Gram-positive diplococci

What is the diagnosis?

Diagnosis is **pneumococcal sepsis**.

The history of splenectomy should cause you to consider encapsulated bacteria as a cause of sepsis. Fulminant pneumococcal disease is the most common cause of sepsis in the splenectomized patient, and it can present with DIC. Sometimes no source is obvious. The clinical scenario may or may not give you "gram-positive, lancet-shaped diplococci" as a clue.

Dx: Blood cultures $\pm$ urinary pneumococcal antigen.

Tx: Vancomycin + ceftriaxone, then narrow coverage based on susceptibility results.



SCRIPT

Healthy, sexually active female presents with a recent onset:

- Dysuria, urgency, and frequency
- U/A: > 10 leukocytes/hpf, no casts; +leukocyte esterase and bacteria
- Urine culture: Gram-positive cocci in clusters that lab tells you are **not** *S. aureus* or *S. epidermidis*.

What is the diagnosis?

Diagnosis is **cystitis**.

Remember that *Staphylococcus saprophyticus* is a urinary pathogen in females, so do not automatically assume that a urine Gram stain with gram-positive cocci is contaminated.

Dx: Urinalysis ± urine culture or Gram stain of unspun urine.

Tx: Oral cephalosporin or amoxicillin-clavulanic acid.

SCRIPT

Patient is a 25-year-old woman, 16 weeks pregnant, in for a routine exam.

- No complaints
- Asymptomatic
- Physical exam is normal
- Urine culture: > 100,000/mL bacteria

What is the significance of the diagnosis?

Diagnosis is **asymptomatic bacteriuria in a pregnant patient**.

2–7% of pregnant women develop asymptomatic bacteriuria (ASB)—usually during the first month of pregnancy. ASB is associated with low birth weight, preterm delivery, and increased preterm mortality! Additionally, if ASB is untreated, 1/3 of pregnant women develop pyelonephritis.

Dx: Recommend 2 consecutive urine cultures before diagnosis is made, but often treatment based on only one urine culture.

Tx: Always treat ASB in pregnant women; admit and treat pregnant patients with pyelonephritis as a “complicated” pyelonephritis (inpatient IV antibiotics 10–14 days).

Pregnancy-safe antibiotics: ampicillin, cephalosporins, and TMP/SMX—**but** do not give TMP/SMX in late pregnancy or to early-nursing mothers because it might cause kernicterus in the child. Avoid tetracycline, doxycycline, and quinolones in pregnancy because they are toxic.

Nephrology

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SCRIPT

50-year-old Caucasian male with long standing hypertension presents with:

- Oliguric acute kidney injury (dose of furosemide was recently increased)
- Orthostatic hypotension
- $U_{Na} > 40$, $Fe_{Na} > 2\%$
- $Fe_{Urea} < 10\%$
- U/A: Bland urine sediment

What is the diagnosis?

Diagnosis is **prerenal AKI**.

Patients who are on diuretics can have $Fe_{Na} > 2\%$ and $U_{Na} > 40$ and they still could be prerenal. In these situations Fe_{Urea} is more accurate than Fe_{Na} . $Fe_{Urea} < 35\%$ in these situations is suggestive of a prerenal state. Fe_{Urea} and $Fe_{Uric\ acid}$ are not affected by diuretic use.

SCRIPT

Young male presents with:

- Acute hemoptysis
- ↑ Serum creatinine
- U/A: Protein and red cell casts
- Renal pathology: Linear IgG on the basement membranes

What is the diagnosis?

Diagnosis is **Goodpasture disease (also called anti-glomerular basement membrane disease)**. Disease in this script affects the lungs and the kidneys, so this is a kind of "pulmonary-renal syndrome." The big two are Goodpasture's (or "anti-GBM disease") and granulomatosis with polyangiitis (usually ANCA+, Wegener's). Younger patients with anti-GBM disease, usually females > males, tend to have the Goodpasture presentation (which includes pulmonary hemorrhage), and older patients, usually females > males, tend to present with only glomerulonephritis. Other pulmonary-renal syndromes include microscopic polyangiitis and Churg-Strauss, but the clinical history here points you to Goodpasture's because of the pulmonary hemorrhage, the male sex of the patient, and the rapidity of the renal failure. The renal biopsy findings are definitive.

Dx: Clinical + serum creatinine + U/A + serum anti-GBM antibodies + renal biopsy. Note: Both major causes of RPGN with pulmonary hemorrhage (anti-GBM disease and granulomatosis with polyangiitis) have normal serum complements; kidney biopsy is needed.

Tx: Plasmapheresis + prednisone + cyclophosphamide.



SCRIPT

Healthy patient develops:

- Fatigue
- Edema of lower extremities within 3 weeks after a streptococcal throat or skin infection
- Serum creatinine > 3
- U/A: Protein, red cells, and red cell casts
- $\downarrow$ Serum complement
- Renal biopsy: Immune complex deposition and crescents

What is the diagnosis?

Diagnosis is **rapidly progressive glomerulonephritis as a presentation of post-infectious glomerulonephritis**.

The buzzword in this case is "crescents." You may have wanted to call this script "post-infectious GN," which is the mechanism, but the diagnosis is more precise. This is rapidly progressive GN. RPGN is characterized by rapid renal impairment and crescent formation. RPGN is not always associated with an infectious cause; it can present insidiously with fatigue and no symptoms referable to the urinary system, and it can be a result of primary renal disease; e.g., membranous.

Dx: Clinical + multiple serologic tests to exclude other causes of glomerulonephritis (e.g., SLE, anti-GBM disease, granulomatosis with polyangiitis, or PIGN) + renal biopsy.

Tx: Treat underlying disease.

SCRIPT

Patient, age 30–55 years, with FH of HTN presents with:

- ↑ BP
- Normal PE
- Normal serum Na, K, HCO_3

What is the diagnosis?

Diagnosis is **essential hypertension**.

Remember the secondary causes of hypertension: OCPs, alcohol use, NSAIDs, pheo, hyperaldosteronism (primary [adrenal] or secondary [renovascular or kidney disease]), glomerulonephritis, Cushing's, hyper- or hypothyroidism, sleep apnea, and coarctation. Be aware of patients who need to be evaluated for secondary causes: Ages < 30 years or > 55 years; refractory or accelerated HTN; $\uparrow$ creatinine > 50% after initiating an ACE inhibitor; renal asymmetry or a unilateral small kidney; abdominal bruit that lateralizes to one side; hypokalemia; triad of headache, palpitations, and sweating; clinical features of glucocorticoid excess; obesity and daytime somnolence $\pm$ history of snoring; brachial-femoral pulse delay; and clinical features of thyroid disease.

Dx: Clinical and of exclusion.

Tx: Therapeutic lifestyle changes $\pm$ antihypertensive drug.

SCRIPT

Patient with recent fluid losses or trip to the operating room presents with:

- Acute kidney injury
- No history of NSAIDs
- $\uparrow$ BUN:Cr
- $U_{Na} < 20$, $\uparrow U_{Osm}$, $FE_{Na} < 1\%$
- U/A: Bland sediment

What is the diagnosis?

Diagnosis is **prerenal acute kidney injury**.

Dx: Clinical history + BUN:Cr + FE_{Na} + U_{Na} .

Tx: Volume resuscitation.

SCRIPT

Patient treated with TMP/SMX for *Pneumocystis pneumonia* presents with:

- Non-oliguric acute kidney injury
- Fever
- Eosinophilia
- $\pm$ Rash
- U/A: WBCs and WBC casts
- Hansel stain on urine: Eosinophils

What is the diagnosis?

Diagnosis is **acute interstitial nephritis**.

Eosinophils in the urine, in the setting of drug exposure, makes this diagnosis. A multitude of drugs can cause AIN, especially NSAIDs and antibiotics. Other causes: SLE, Sjögren's, *Legionella*, leptospirosis, or sarcoidosis.

Dx: Clinical + serum creatinine + CBC with differential + U/A (normal U/A does not exclude!) + stain for urinary eosinophils ± renal biopsy.

Tx: Discontinue offending drug or treat underlying disease ± prednisone.

Misc: You might have guessed ATN if you loosely associate a drug exposure with kidney injury. On the exam, if you'd been given a multiple choice between AIN and ATN, you probably would have guessed correctly, but the Boards are not that straightforward. They require that you definitely know the differences between these two.



SCRIPT

Patient presents with:

- Non-oliguric acute kidney injury after undergoing a contrasted imaging study
- $U_{Na} > 40$, $Fe_{Na} > 2\%$
- U/A: Muddy or "dirty brown granular casts" and free renal tubular cells

What is the diagnosis?

Diagnosis is **acute tubular necrosis**.

Recall the causes of ATN: Ischemia (especially hypotension) and toxins (radiocontrast dye, aminoglycosides, amphotericin B, and heme pigments are major culprits). The important buzz phrase is "dirty brown casts." ATN often is seen after a renal insult, especially if underlying renal disease is present, such as diabetes.

Dx: Clinical (watch for return of renal function after volume resuscitation; if fails to return, consider ATN) + U/A (not all cases of ATN have the casts and tubular cells, however) + $FE_{Na} + U_{Na}$.

Tx: Replenish volume + discontinue nephrotoxins. Dialysis may be needed.

SCRIPT

Patient on chronic NSAIDs presents with:

- Asymptomatic rise in creatinine
- Edema of the face and lower extremities
- U/A: Proteinuria with bland sediment $\pm$ sterile pyuria
- Urine protein/creatinine > 3

What is the diagnosis?

Diagnosis is **NSAID-induced acute interstitial nephritis**

Patients with NSAID-induced AIN typically are those with normal renal function who present after being on an NSAID for months without rash, eosinophilia/-uria.

Dx: Clinical but can be confirmed by renal biopsy.

Tx: Discontinue NSAIDs, $\pm$ steroids.

SCRIPT

Healthy patient presents with:

- Acute edema of the feet and face
- ↓ Serum albumin
- ↑ Serum cholesterol
- 24-hour urine = > 3 g protein
- ± Deep venous thrombosis
- ± Recurrent pneumococcal pneumonia

What is the diagnosis?

Diagnosis is **nephrotic syndrome**.

The cause of nephrotic syndrome in this patient could be primary renal pathology (minimal change disease, FSGS, or membranous) or a systemic disease (diabetes, SLE, amyloidosis, Hodgkin's, or CLL). The classic script for nephrotic syndrome: Hypoalbuminemia, edema, and hypercholesterolemia. Urine will have > 3–3.5 gm of protein per 24-hour period. Be able to recognize the long-term complications of nephrotic syndrome, especially **venous thrombosis** and **recurrent infections**.

Dx: Clinical + serum creatinine + U/A + spot protein:creatinine (or 24-hour urine protein measurement) + renal biopsy (unless diabetes is present) + specific testing to diagnose underlying pathology (e.g., C3/C4 in SLE).

Tx: Treat the underlying disease + treatment of hyperlipidemia + ACE inhibitor + sodium restriction + diuretic.



SCRIPT

20–30-year-old male Caucasian presents with:

- Upper respiratory symptoms
- Cola-colored urine
- $\pm \uparrow$ BP
- $\pm \uparrow$ Serum creatinine
- U/A: Protein and red cell casts
- Normal serum complement

The diagnosis is _____
caused by _____.

The diagnosis is **acute glomerulonephritis caused by IgA nephropathy**.

Peak incidence: 20–30 years of age with males > females; Caucasians and Asians are the primary ethnicities affected.

In this case, the timing of the glomerulonephritis in relation to the infection is very important in distinguishing between IgA nephropathy and post-infectious GN. IgA symptoms occur **with** the infection; post-infectious occur **about 2 weeks after**. Also, the complement levels help you to differentiate: Complement is normal in IgA and low in post-infectious. Patients with IgA nephropathy can also be detected after a routine U/A shows microscopic hematuria ± proteinuria.

Dx: Clinical + serum creatinine + U/A + complement + renal biopsy.

Tx: Corticosteroids ± immunomodulators + ACE inhibitor + treatment of hyperlipidemia.

Misc: The clinical scenario could try to confuse you by including an antecedent strep infection and positive anti-strep antibodies. Remember that these remain positive for a prolonged period. Know that the renal lesion in IgA nephropathy is identical to that seen in the systemic illness Henoch-Schönlein purpura.

SCRIPT

Patient with streptococcal infection of the skin or throat 3 weeks ago presents with:

- Cola-colored urine
- $\pm \uparrow$ BP
- $\pm \uparrow$ Serum creatinine
- U/A: Protein and red cell casts
- $\downarrow$ Serum complement levels

What is the diagnosis?

Diagnosis is **acute post-infectious glomerulonephritis**.

The timing of the glomerulonephritis in relation to the infection is very important in distinguishing between IgA nephropathy and post-infectious GN. IgA symptoms occur **with** the infection; post-infectious occur **about 2 weeks after**. Also, the complement levels help you to differentiate: Complement is normal in IgA and low in post-infectious. The clinical scenario could try to confuse you by including an antecedent strep infection and positive anti-strep antibodies. Remember that these remain positive for a prolonged period.

Dx: Clinical + serum creatinine + U/A ± anti-streptococcal antibodies (if clinical history of streptococcal infection) ± renal biopsy.

Tx: Supportive. Generally resolves spontaneously.

Misc: Know that post-infectious GN can be caused by organisms other than streptococci, including staphylococci and the causes of acute endocarditis.



SCRIPT

Healthy patient presents with:

- Confusion and tinnitus $\pm$ coma
- N/V, diarrhea, fever
- $\uparrow$ Respiratory rate
- HAGMA + respiratory alkalosis

What is the diagnosis?

Diagnosis is **salicylate intoxication**.

Always think about salicylates when you see the mixed HAGMA + respiratory alkalosis. Although aspirin isn't used orally as an analgesic much, salicylic acid overdose can occur with some herbals, excessive use of salve containing oil of wintergreen and inadvertent excessive ingestion of oil of wintergreen in Pepto-Bismol®. Be aware that enteric-coated formulations take longer to be absorbed, so the peak concentrations can be very delayed after ingestion.

Dx: Clinical + suspect from ABG showing HAGMA; serum salicylate concentration + creatinine (if increased, is indication for dialysis).

Tx: Activated charcoal (if within 2 hours of ingestion) + glucose-containing IVF (if mentation is altered) + sodium bicarbonate (even if already alkalotic); do not give acetazolamide; it is contraindicated; ± dialysis.

SCRIPT

A middle-aged smoker presents with a lung mass and:

- ↓ Serum Na
- ↓ S_{Osm} , ↑ U_{Osm} , ↑ urine SG, $U_{Na} > 40$
- Normal serum Cl and K
- Normal TSH
- Cosyntropin stimulation test: ↑ Cortisol at 30 and 60 minutes

The diagnosis is _____
due to _____.

The diagnosis is **SIADH** due to **malignancy**.

Patients who are hyponatremic should excrete water, not hold onto it. This case shows concentrated urine with a high U_{Osm} , so the patient is not excreting water. Inappropriately, he is holding onto water. In the setting of a lung mass, the diagnosis is most likely SIADH, although you should exclude thyroid disease and adrenal insufficiency before making the diagnosis. Causes of SIADH are extensive. Small cell lung cancer is common, but other causes include any CNS or lung disturbances, drugs, surgery, HIV infection, and others. Other malignancies that cause SIADH include other lung tumors, duodenal or pancreatic cancer, and cancers of the head and neck.

Dx: S_{Osm} (decreased) + U_{Osm} (increased, usually > 300) + U_{Na} (> 40) + TSH + normal cosyntropin stimulation test.

Tx: Treat underlying cause or stop offending drugs + fluid restriction to 800–1,000 mL/day $\pm$ oral sodium tablets $\pm$ IV hypertonic saline (if neurologic symptoms); refractory chronic hyponatremia can be treated with an ADH receptor blocker (such as tolvaptan or conivaptan), however, long term use is not advised due to risk of liver injury. Isotonic saline can worsen hyponatremia in SIADH.

SCRIPT

Patient with depression on an SSRI develops:

- $\downarrow$ Serum Na without orthostasis or edema
- $\downarrow S_{Osm}, \uparrow U_{Osm}, \uparrow$ urine SG, $U_{Na} > 40$
- Normal serum Cl and K
- Normal TSH

The diagnosis is _____
due to _____.

The diagnosis is **SIADH** due to **SSRI use**.

The history of SSRI use gives this away. Causes of SIADH are extensive, aside from small cell lung cancer, and include any CNS or lung disturbances, drugs, surgery, HIV infection, and others. Other drugs that cause SIADH or mimic ADH include: Carbamazepine, haloperidol, NSAIDs, amiodarone, cyclophosphamide, chlorpropamide, and many others. HCTZ also is associated with hyponatremia, but the mechanism is unrelated to ADH (HCTZ impairs urinary dilution in DCT).

Dx: S_{Osm} (decreased) + U_{Osm} (increased, usually > 300) + U_{Na} (> 40) + TSH + normal cosyntropin stimulation test.

Tx: Treat underlying cause or stop offending drugs + fluid restriction to 800 mL/day $\pm$ oral sodium tablets $\pm$ IV hypertonic saline (if neurologic symptoms); refractory chronic hyponatremia due to underlying medical conditions can be treated with an ADH receptor blocker, such as tolvaptan or conivaptan (not advised for long-term use).

SCRIPT

Patient s/p neurosurgery develops:

- Increased urine output and $\uparrow$ serum Na
- Normal serum Cl, K, HCO_3 , creatinine, and glucose
- U/A = No protein
- Water restriction: Persistent $\downarrow U_{\text{Osm}}$

What is the diagnosis?

Diagnosis is **diabetes insipidus**.

Anytime you see a water restriction test in a clinical scenario, the question is probably asking about diagnosing diabetes insipidus. This patient continues to have dilute urine ($\downarrow U_{Osm}$) in spite of water restriction, which is not what would happen if the tubules were functioning normally in the setting of an increasing serum Na. In the normal setting, as the serum Na increases, ADH will signal the distal nephron to absorb water and maintain homeostasis. Because this patient continues to excrete water as he becomes hypernatremic, the patient has a form of DI. You cannot determine which type of DI is present because ADH was not given as part of the testing in the clinical scenario. Most likely, this patient has central DI because he underwent neurosurgery.

Dx: Clinical + persistently low U_{Osm} after water restriction; administration of ADH increases U_{Osm} in nephrogenic DI, but does not increase U_{Osm} in central DI.

Rx depends on type of DI: Central = exogenous desmopressin (which is ADH);
nephrogenic = treat underlying disorder $\pm$ diuretic use (amiloride or thiazide).

SCRIPT

Patient with bipolar disorder on lithium develops:

- Nocturia
- Serum Na 145–150
- Normal serum Cl, K, HCO_3 , creatinine, and glucose
- U/A: No protein
- Lithium level: In therapeutic range
- U_{Osm} : $\downarrow$ And remains unchanged with water restriction and administration of arginine vasopressin

The diagnosis is _____
due to _____.

The diagnosis is **nephrogenic diabetes insipidus** due to **lithium**.

Any time lithium is in a question, consider that the diagnosis might be either a lithium side effect or a sign of toxicity. Anytime you see a water restriction test in a clinical scenario, the question is probably asking about diagnosing diabetes insipidus. This patient has increased urine volume and persistently dilute urine in the setting of water restriction, even after administration of DDAVP®. Thus, diabetes insipidus is present, and in this script, it is nephrogenic, because the kidneys do not concentrate urine in response to AVP (ADH).

Dx: Clinical + persistently low U_{Osm} after water restriction $\pm$ administration of AVP with subsequent measurement of urine volume and S_{Osm} and U_{Osm} .

Rx depends on type of DI: Central = exogenous desmopressin (which is ADH); nephrogenic = treat underlying disorder (including discontinue the lithium, if able) $\pm$ diuretic use (amiloride or thiazide), if unable to discontinue the underlying medication. Low-sodium, low-protein diet; NSAIDs.

SCRIPT

Patient with myeloma has the following labs:

- ↓ Serum HCO_3
- ↓ Serum K
- ↑ Serum Cl
- Anion gap < 10
- ↑ Serum Ca
- Mildly ↑ creatinine

The diagnosis is _____
caused by _____.

The diagnosis is **NAGMA** caused by **Type 2 RTA**.

Myeloma is associated with Type 2 RTA. Stones are associated with Type 1, and diabetes is associated with Type 4. There is no Type 3 in adult medicine.

SCRIPT

Patient presents with a kidney stone and:

- ↓ Serum HCO_3
- ↓ Serum K
- ↑ Serum Cl
- Anion gap < 10
- Normal serum Ca

The diagnosis is _____
caused by _____.

The diagnosis is **NAGMA** caused by **Type 1 RTA**.

Stones are associated with Type 1 RTA. Myeloma is associated with Type 2 RTA, and diabetes is associated with Type 4. There is no Type 3 in adult medicine.

SCRIPT

Patient with long-standing T2DM develops:

- ↓ Serum HCO_3
- ↑ Serum K
- ↑ Serum Cl
- Anion gap < 10
- Mildly ↑ creatinine

The diagnosis is _____
caused by _____.

The diagnosis is **NAGMA** caused by **Type 4 RTA**.

The important clue in this question is the history of long-standing diabetes. Know the long-term complications of diabetic nephropathy (aside from proteinuria)—notably, Type 4 RTA and hypoaldosteronism.

SCRIPT

Patient with DVT on outpatient enoxaparin and no other meds presents with:

- ↑ Serum K
- Normal serum creatinine

What is the diagnosis?

Diagnosis is **heparin-induced hyperkalemia**.

Even low-dose heparin can cause hyperkalemia and Type 4 RTA via direct toxic effect on adrenal aldosterone production.

SCRIPT

Healthy patient develops:

- Self-limited febrile illness
- U/A: New proteinuria that resolves when the patient recovers

What is the diagnosis?

Diagnosis is **transient proteinuria**.

When proteinuria is transient and associated with fever or exercise, it can be normal. You might have guessed IgA nephropathy if you had loosely associated "infection" with "kidney problem." Recognize that you need to remember the diseases a bit more precisely, rather than have multiple loose associations. IgA nephropathy is a glomerulonephritis that can be instigated by a viral infection. This script has only transient proteinuria, without red cells or casts, which is not a glomerulonephritis.

Dx: Clinical + U/A.

Tx: None required.

SCRIPT

Healthy patient with normal U/A given TMP/SMX for treatment of rhinitis develops:

- ↑ Serum creatinine 0.5 → 0.9 that returns to normal after completing TMP/SMX

What is the diagnosis?

Diagnosis is **reduced tubular secretion of creatinine induced by trimethoprim**.

Remember the association between trimethoprim and reduced tubular secretion of creatinine.

This is sometimes confusing because TMP/SMX can also cause an acute interstitial nephritis.

Dx: The normal U/A confirms that interstitial nephritis is not the mechanism for the azotemia. Interstitial nephritis would have pyuria (WBCs in urine), low-grade proteinuria, and sometimes WBC casts and eosinophiluria.

Tx: None required.



SCRIPT

Previously healthy patient develops:

- Acute confusion and bilaterally decreased vision
- HAGMA
- $\uparrow$ Osmolar gap
- Normal serum glucose and creatinine

What is the diagnosis?

Diagnosis is **methanol ingestion**.

Stop now and review how to calculate the osmolar gap:

$OG = \text{Measured Plasma}_{Osm} - \text{Calculated Plasma}_{Osm}$

$\text{Calculated Plasma}_{Osm} = (2 \times Na) + \text{glucose}/20 + \text{BUN}/3$

This calculation is critical when assessing acid-base questions on an exam. Remember that two acid alcohol ingestions are associated with both a HAGMA and an increased osmolar gap: Methanol and ethylene glycol. Methanol is the ingestion associated with blindness. The clinical history could include a reference to ingestion of "moonshine" (which is sometimes contaminated with methanol).

Dx: Clinical + osmolar gap > 20 + HAGMA.

Tx: Fomepizole with folate + dialysis.



SCRIPT

Previously healthy patient presents with:

- Rapid confusion → coma, with normal exam
- Normal serum Na, K, HCO_3 , creatinine, and glucose
- Normal anion gap
- ↑ Osmolar gap

What is the diagnosis?

Diagnosis is **isopropyl alcohol ingestion**.

Isopropyl alcohol is metabolized to acetone. Rapid CNS impairment is typical. Testing for both serum and urine ketones are positive, reflecting the presence of acetone. Recognize that opiate overdose would be associated with miosis and hypoventilation. Another diagnosis that presents similarly is carbon monoxide poisoning, but it is not associated with an increased OG. Methanol and ethylene glycol ingestions are associated with HAGMA, but isopropyl alcohol ingestion is not associated with HAGMA or acidosis.

Recall how to calculate the osmolar gap:

$$\text{OG} = \text{Measured Plasma}_{\text{Osm}} - \text{Calculated Plasma}_{\text{Osm}}$$

$$\text{Calculated Plasma}_{\text{Osm}} = (2 \times \text{Na}) + \text{glucose}/20 + \text{BUN}/3$$



SCRIPT

Patient presents with:

- New $\uparrow$ BP
- $\downarrow$ Serum K
- Metabolic alkalosis
- $\downarrow$ Plasma renin activity
- $\downarrow$ Plasma aldosterone concentration
- $\pm$ FH of same

The diagnosis is _____.

The diagnosis is **Liddle syndrome**.

Liddle's is an autosomal dominant disease of the collecting tubule, where sodium absorption and potassium excretion are enhanced. Most patients present in childhood. Note: This case differs from Bartter's and Gitelman's because hypertension is a feature. The features are similar to mineralocorticoid excess, but the plasma aldosterone concentration is **decreased**. Cushing's also mimics hyperaldosteronism (but with a low plasma aldosterone concentration, because the excess glucocorticoid binds mineralocorticoid receptors), but if Cushing's were the correct answer, the clinical scenario would include many other signs and symptoms of steroid excess. And, the family history of similar disease suggests a genetic syndrome. Licorice ingestion also can present similarly.

Dx: Clinical + low plasma renin activity + low plasma aldosterone concentration + genetic testing.

Tx: Amiloride or triamterene to treat the HTN. Note that spironolactone is ineffective because the symptoms are not mediated by aldosterone.



SCRIPT

Previously healthy patient develops:

- Acute confusion
- Calcium oxalate crystals in the urine sediment
- HAGMA
- ↑ Osmolar gap
- Normal serum glucose and creatinine

What is the diagnosis?

Diagnosis is **ethylene glycol ingestion**.

Stop now and review how to calculate an osmolar gap:

$$\text{OG} = \text{Measured Plasma}_{\text{Osm}} - \text{Calculated Plasma}_{\text{Osm}}$$
$$\text{Calculated Plasma}_{\text{Osm}} = (2 \times \text{Na}) + \text{glucose}/20 + \text{BUN}/3$$

This calculation is critical when assessing acid-base questions on an exam. Remember that two acid alcohol ingestions are associated with both a HAGMA and an increased osmolar gap: Methanol and ethylene glycol. Ethylene glycol is associated with calcium oxalate crystals in the urine. The clinical history could include a reference to ingestion of antifreeze.

Dx: Clinical + osmolar gap > 20 + HAGMA.

Tx: Fomepizole with folate + dialysis.

SCRIPT

Normotensive patient presents with:

- Severe muscle cramping and fatigue
- ↓ Serum K
- ↓ Serum Mg
- Metabolic alkalosis
- ↑ Plasma renin activity
- ↑ Plasma aldosterone concentration

What is the diagnosis?

Diagnosis is **Gitelman's**.

Gitelman syndrome is an autosomal recessive disease of the distal tubule, where a mutation results in an abnormality in the Na-Cl cotransporter, thus reducing its action. The patients clinically appear to be under the chronic effects of a thiazide diuretic, thus, the features. Most patients present as older children or adults. The hypomagnesemia associated with severe muscle cramps is a defining feature. Of the inherited entities that present with hypokalemic metabolic alkalosis, Gitelman's is the one associated with severe magnesium wasting. Volume contraction is the cause of the increased renin and aldosterone.

Dx: Clinical (diagnosis of exclusion; exclude surreptitious vomiting and diuretics) + urine chloride (> 40 in Gitelman's but < 25 in volume contraction) + urine screen for diuretic use; urinary calcium measurement helps differentiate between Gitelman's (normal) and Bartter's (high-normal or increased). Bartter's usually presents in childhood.

Tx: K-sparing diuretic (spironolactone) $\pm$ ACE inhibitor + K and Mg replacement.

SCRIPT

Trauma patient presents with:

- Circumoral and extremity paresthesias after several units of packed red blood cells
- Metabolic alkalosis $\pm$ hypokalemia
- Normal serum Ca

What is the diagnosis?

Diagnosis is **citrate-induced hypocalcemia**.

Metabolism of each millimole of citrate forms 3 milliequivalents of bicarbonate. If liver function is impaired, citrate (present in blood products) accumulates and binds Ca^{++} leading to low ionized calcium levels and symptoms of hypocalcemia, despite normal total serum calcium levels. If the ability of the kidneys to excrete the bicarbonate is overwhelmed, then alkalosis also occurs. Hypokalemia, then, may occur as a result of alkalotic cell shifts. Other potential complications of massive transfusion include coagulopathy (due to DIC from traumatic event or dilutional effect).

Dx: Measure the ionized calcium; remember that the total serum calcium usually is normal.

Tx: Calcium replacement.

SCRIPT

Chronically malnourished alcoholic admitted to the hospital develops:

- Marked weakness and quiet bowel sounds on days 2–3 that worsen with each meal

What is the diagnosis?

Diagnosis is **refeeding syndrome**.

Patients who are at risk for refeeding syndrome are anorexics who have lost weight quickly or have lost more than 70% of their body weight, and other malnourished patients, including the elderly, those with cancer, and the homeless/alcoholics. The electrolyte abnormalities associated with refeeding syndrome are caused by shifts: Hypophosphatemia, hypokalemia, and hypomagnesemia. The low phosphorus is the most significant finding, usually, and leads to the marked weakness. After a few days, edema may develop because the body begins to avidly hold onto fluids.

Dx: Clinical + measurement of phosphorus, magnesium, and potassium.

Tx: Careful refeeding process with limited, gradually increasing intake + electrolyte replacement. If the phosphorus is < 2 , replenish parenterally.



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SCRIPT

Patient presents after hours of:

- Band-like tightness around chest or abdomen
- Bilateral leg weakness $\pm$ arms, which may progress to paraplegia
- Bilateral decrease in sensation to touch in the legs $\pm$ arms to a specific level, above which sensation is normal
- Difficulty voiding
- MRI: Enhanced signal suggesting bilateral cord swelling at a specific level without any external compression
- CSF: Slight $\uparrow$ protein, mild lymphocytosis, no oligoclonal bands

What is the diagnosis?

Diagnosis is **transverse myelitis**.

TM is thought to be due to autoimmune inflammation—about half the time it is preceded by an infection. Also, it is associated with autoimmune diseases (e.g., SLE, mixed connective tissue, Sjögren's, systemic sclerosis, RA) and multiple sclerosis.

You might have guessed GBS if you associate motor weakness and increased protein in the CSF. Keys to this case: Motor weakness is not described as "ascending," characteristic of GBS, and there is a definite sensory level, which does not occur in GBS. GBS usually is motor only. TM can occur in many autoimmune diseases (e.g., lupus, scleroderma, RA, or MCTD) and as a feature of MS, so a question could include other elements that relate to these diagnoses. Think TM when you see bilateral motor disease with a sensory level and no obvious cause on MRI.

Dx: MRI. NMO antibodies, if present, are associated with recurrence. Presence of lesions on brain MRI predicts progression to MS.

Tx: Recent 2011 AAN guideline recommends **corticosteroids** and plasmapheresis if unresponsive (level of evidence C).



SCRIPT

Elderly alcoholic falls at home, hits the right side of his head, and c/o HA.

Exam shows:

- Confusion that is becoming marked somnolence
- Fixed and dilated R-pupil
- Evolving R-sided upper and lower extremity weakness

What is the diagnosis?

Diagnosis is **uncal herniation**.

Downward displacement of the midbrain with herniation is a potential complication of increased ICP, as could occur with an acute SDH or EDH. Lucidity after the injury can be seen in both. EDH occurs when trauma to the skull base tears the middle meningeal artery. Uncal herniation in this script is more likely due to an acute SDH. Regardless, evidence of uncal herniation includes an ipsilateral fixed and dilated pupil caused by entrapment of the ipsilateral oculomotor nerve. The cerebral peduncle that is contralateral to the hematoma becomes compressed as the herniation occurs, and ipsilateral hemiplegia results.

Dx: CT head (MRI is alternative). Pineal shift of > 8 mm on CT is usually associated with coma or depressed conscious level.

Tx: Observation $\pm$ neurosurgery.

Misc: Lumbar puncture is contraindicated because of the increased ICP. Chronic SDH often presents as headaches, lightheadedness, and impaired cognition. Acute and chronic SDH more often are seen in older adults, and EDH more often is seen in young people.

SCRIPT

Known hypertensive with hemorrhagic infarction of the pons has the following:

- Preserved alertness and thought
- Ability to communicate using blinks
- Quadriplegia
- Speechlessness

What is the diagnosis?

Diagnosis is **locked-in syndrome**.

This is a simple diagnosis to recognize because cognition is preserved, but the patient cannot speak or move and only can communicate through eye blinks.

Dx: Clinical and of exclusion (use imaging, EEG, and LP to exclude other causes).

Tx: Modification of risk factors for stroke and any appropriate intervention to address stenotic lesions or clots. Aggressive physical therapy should be offered because some patients will regain some function with time, although most do not.

Misc: DDx includes persistent vegetative state. Differentiate by watching for purposeful eye movements, such as horizontal gaze, at the bedside. Occasionally patients with locked-in syndrome can have purposeful movements of the tongue, facial expression, and some limb movements.

SCRIPT

Patient presents with:

- Irritability that progresses to an acute, severe, pulsatile, unilateral headache that lasts hours
- Nausea and vomiting
- Desire for quiet and dark
- $\pm$ Sensation of stinging when scalp is touched

What is the diagnosis?

Diagnosis is **migraine without aura** (previously “common migraine”).

Most patients (~75%) have headaches without aura. The stinging sensation is called “cutaneous allodynia” and can actually occur on the scalp, face, and eye (if + contact lenses). Most patients with migraine will have allodynia at some point during or after the HA.

Dx: Clinical.

Tx: NSAIDs, acetaminophen, triptans, dihydroergotamine at first sign of HA; ED = triptans; IV prochlorperazine or metoclopramide + diphenhydramine to prevent dystonia.

Misc: Don't use triptans or ergots in patients with CHD or h/o stroke, Prinzmetal's, and/or pregnancy. Do not combine triptans with MAOIs or use within 24 hours of ergots. Prophylaxis is recommended if > 2–4 HAs/month; can use beta-blockers (not if > 60 years old), amitriptyline, valproic acid, gabapentin, or topiramate. Prophylaxis definitely recommended in young females with aura, on OCPs, and > 4 HAs/month because of risk of stroke. Avoid OCPs in women who have migraine with aura (↑ stroke). But, remember that valproate is associated with birth defects. Watch for rebound HAs, which occur in patients who frequently self-medicate HAs with analgesics, such as acetaminophen and aspirin.

SCRIPT

Young patient presents with acute onset:

- Irritability
- Bright light in the center of vision followed by unilateral blindness
- Zigzagging lines and sparkling lights in peripheral vision
- Self-resolving tingling on one side of face followed by numbness
- Headache

What is the diagnosis?

Diagnosis is **migraine with aura (previously "classic migraine")**.

The question may give you only the aura and ask for the Dx or to predict that a HA should come soon. Aura symptoms should be short-lived (couple of hours). People can have aura without HA, and Dx is still migraine, but this is hard to differentiate from TIA, so you won't likely see that presentation in an exam setting. The term "classic" migraine isn't used much anymore.

Dx: Clinical.

Tx: NSAIDs, acetaminophen, triptans, dihydroergotamine at first sign of HA; ED = triptans; IV prochlorperazine or metoclopramide + diphenhydramine to prevent dystonia.

Misc: Don't use triptans or ergots in patients with CHD or h/o stroke, Prinzmetal's, and/or pregnancy. Do not combine triptans with MAOIs or use within 24 hours of ergots. Prophylaxis is recommended if > 4 HA/month; can use beta-blockers (not if > 60 years old), amitriptyline, valproic acid, gabapentin, or topiramate. Prophylaxis definitely recommended in young females with aura, on OCPs, and > 2–4 HAs/month because of risk of stroke. Avoid OCPs in women who have migraine with aura (↑ stroke). But, remember that valproate is associated with birth defects. Watch for rebound HA—occurs in patients who frequently self-medicate HA with analgesics (e.g., acetaminophen and ASA).

SCRIPT

Young patient presents with acute onset:

- Irritability
- Word-finding difficulties that progress to aphasia
- An acute, severe, pulsatile, unilateral headache that lasts hours
- Nausea and vomiting

What is the diagnosis?

Diagnosis is **complicated migraine headache**.

Because of the aphasia, you might have guessed stroke and assumed that the headache is stroke-related. Recognize that migraine can present with classic motor impairment, including speech, so don't be afraid to make that diagnosis.

Dx: Clinical.

Tx: NSAIDs, acetaminophen, triptans, dihydroergotamine at first sign of HA; ED = triptans; IV prochlorperazine or metoclopramide + diphenhydramine to prevent dystonia.

Misc: Don't use triptans or ergots in patients with CHD or h/o stroke, Prinzmetal's, and/or pregnancy. Do not combine triptans with MAOIs or use within 24 hours of ergots. Prophylaxis is recommended if > 4 HA/month; can use beta-blockers (not if > 60 years old), amitriptyline, valproic acid, gabapentin, or topiramate. Prophylaxis definitely recommended in young females with aura, on OCPs, and > 2–4 HAs/month because of risk of stroke. Avoid OCPs in women who have migraine with aura (↑ stroke). But, remember that valproate is associated with birth defects. Watch for rebound HA—occurs in patients who frequently self-medicate HA with analgesics (e.g., acetaminophen and ASA).



SCRIPT

Patient presents with:

- 3 acute, severe, ice-pick–like, unilateral, headaches in last week, after drinking wine, which wake from sleep
- Congestion and lacrimation on same side of face as headache

What is the diagnosis?

Diagnosis is **cluster headache**.

This diagnosis is easy: Ipsilateral congestion and lacrimation with headache. These clusters are often triggered by alcohol ingestion. This HA type has been associated with suicide in patients who are unable to get relief from the clusters. No other diagnosis presents this way. Cluster headaches are more common in males.

Dx: Clinical.

Tx: Inhalation of 100% O₂ ± SQ or intranasal triptans. Avoid triptans if h/o CHD, stroke, Prinzmetal's, and/or pregnancy. Verapamil for prophylaxis—start at onset of cluster. Titrate oral dose upward, but monitor for blocks and bradycardia with ECG as dose escalates.



SCRIPT

Healthy patient presents with h/o:

- Recurrent headaches that begin during sexual intercourse at orgasm and last ~ 1–2 hours after
- No meningismus
- No vomiting

What is the diagnosis?

Diagnosis is **benign sexual headache**.

Another term is "coital cephalgia" or "coital headache." These headaches often occur in a recurrent fashion, but not necessarily with every episode of intercourse. You might have guessed SAH, which would be reasonable if this was the first instance of HA and if the patient had other symptoms such as nausea, vomiting, and meningismus.

Dx: If the headache is isolated (or first instance), think about aneurysm with or without intracranial bleed. Evaluate with head CT.

Tx: Once SAH or aneurysm excluded, Tx is symptomatic.



SCRIPT

Young woman with h/o acne, on isotretinoin, presents with:

- Recurrent headaches
- Rushing water noises in the ears
- Occasional, brief, graying of parts of the visual field
- Occasional sparkles in the visual field
- $\pm$ Intermittent diplopia
- BMI > 30
- Papilledema

What is the diagnosis?

Diagnosis is **idiopathic intracranial hypertension**.

Also termed "pseudotumor cerebri," but be aware of IIH term for the Board exam. Diplopia can be caused by transient 6th nerve palsy and is not present in every patient, but it's a useful part of the script to remember so you don't mistake this diagnosis for multiple sclerosis or some stroke syndrome. 92% have some visual field loss on testing and 26% have sustained visual loss. Rushing water or wind noises are sometimes present with the headaches (60%), but don't confuse this with Ménière's, which is not associated with papilledema and headache. Also, notice that the script does not say "obese," but rather, an obese BMI is included. Be sure you can interpret a BMI on the exam.

Dx: Head CT or MRI to exclude mass; LP to document increased opening pressure > 200 mmH₂O with normal cells and protein; visual field testing. Important to do magnetic resonance venography (MRV) and rule out venous sinus thrombosis in at-risk patients (e.g., OCP or pregnant).

Tx: Important to preserve vision; start with weight loss and acetazolamide ± loop diuretics.

More extensive: Surgery, serial LPs, and corticosteroids (if unresponsive).



SCRIPT

Patient older than 60 years presents with:

- Decreased attention and focus; inability to execute complex tasks
- Apathy
- Urinary incontinence
- “Magnetic” gait

What is the diagnosis?

Diagnosis is **normal pressure hydrocephalus**.

"Magnetic gait" means that the patient's walk looks as if his feet are stuck to the floor—broad base with short strides. You might have guessed Parkinson's with dementia, but that diagnosis doesn't explain the urinary incontinence. And a magnetic gait is different from the "festinating gait" of Parkinson's (which has a narrower base). Parkinson dementia also tends to have more prominent psychotic features and personality changes with less disruption in executive function. A crude way to remember NPH is wet (incontinence), wobbly (ataxia), and wacky (dementia).

Dx: Formal assessment of cognition (e.g., mini-mental status exam); MRI or CT to show hydrocephalus; LP shows normal opening pressure and cell count.

Tx: Ventricular shunt; improvement in cognition and gait post-LP can suggest benefit from VP shunt.

SCRIPT

Patient older than 60 years presents with:

- Gradual onset over years of decreasing memory for recent events and facts
- Repeated loss of familiar objects in home
- Word-finding difficulty
- Inability to recall objects' names
- Lack of insight into memory impairment

What is the diagnosis?

Diagnosis is **Alzheimer dementia**.

This patient has definite dementia because there is definite impairment in 2 or more domains of cognition (memory and language) that impact her daily living. This is ALZ, and not another form of dementia, because she has no risk factors for vascular dementia, her age (> 60 years) favors ALZ; and, the course has been insidious and progressive. This script is not vascular dementia because there is no description of motor or sensory deficits, and the progressive dementia is not stepwise.

Dx: H&P, cognitive, and neuropsych testing = progressive impairment in ≥ 2 domains (memory, reasoning/judgment, visuospatial skills, language, personality) and interferes with ADLs + insidious onset + no h/o CVAs or features of DLBs or FTD. Do not Dx based on MRI or PET results.

Tx: Donepezil, rivastigmine, galantamine (CIs) $\pm$ memantine; can stop Tx if dementia very advanced.
Agitation: Atypical antipsychotics (olanzapine, risperidone, quetiapine) $\uparrow$ mortality; haloperidol $\uparrow$ QT interval and $\rightarrow$ $\downarrow$ cognition and extrapyramidal side effects.



SCRIPT

Otherwise healthy patient in his 50s presents with:

- Gradual but progressive personality changes, including extreme sensitivity and emotional responses, unpredictable aggression, offensive statements, and inappropriate sexual comments
- Declining hygiene
- Hoarding
- Poor adaptation to new situations
- Impairment of focus and attention with difficulty in problem solving
- Lack of insight into changes in personality
- $\pm$ Grasp, snout, and/or sucking reflex
- MRI : Mild focal frontal atrophy

What is the diagnosis?

Diagnosis is **frontotemporal dementia**.

There are several forms of FTD, but this script presents the most common form. ALZ is a consideration, but recognize that this patient's age of onset is too young (FTD age = 55–60 years; ALZ > 60). And, the script includes significant social impairment without memory problems—very unlike ALZ. You might have guessed DLB, which does present with dementia in young people, but DLB is marked by significant psychosis, especially visual hallucinations.

Dx: H&P + CT or MRI of brain to exclude other causes (CVA, SDH, NPH, masses) and shows bifrontal atrophy → bitemporal atrophy (late); neuropsych testing doesn't help differentiate from other causes of dementia.

Tx: SSRIs; atypical antipsychotics in low doses, but remember FDA advisory about increased risk of mortality with their use in elderly dementia patients. Cholinesterase inhibitors don't help much.

Misc: Lots of side effects of meds in these patients, especially extrapyramidal symptoms.



SCRIPT

Patient in her 40s presents with:

- Increased sleeping
- Rapidly progressive memory and cognitive impairment (over months)
- Personality changes, with apathy and labile emotions
- Myoclonus
- Hyperreflexia
- MRI: Increased signal (T2 and FLAIR) in putamen and head of caudate
- EEG: Periodic synchronous biphasic or triphasic sharp wave complexes

What is the diagnosis?

Diagnosis is **Creutzfeldt-Jakob disease**.

This entity can be recognized by the combination of dementia and myoclonus, which is how you differentiate CJD from frontotemporal dementia. The myoclonus often occurs after startle. Other clues: Rapid onset of progressive dementia and characteristic EEG.

Dx: Brain biopsy = spongiform change, loss of neurons without inflammation, accumulation of the prion, EEG and MRI are supportive. LP: Normal cell count and glucose; protein may be ↑; may find 14-3-3 protein in sporadic cases (~ 82%) but is not specific for CJD.

Tx: Always fatal; no treatment.

Misc: There are 4 forms: Sporadic; variant (associated with beef and bovine spongiform encephalopathy); familial; and iatrogenic (cadaveric hormones, transplants/grafts of dura, cornea and liver transplants, and using contaminated neurosurgical instruments). A cranial nerve palsy, problems with sensation, and/or peripheral nerve disease should make you think of a different Dx.



SCRIPT

Patient age 60 years or older presents with:

- Weakness
- Difficulty buttoning clothes, tying shoes, and using the computer keyboard
- "Dragging" feeling in the legs
- Slowing of mental processes, with word-finding difficulty
- Unilateral resting tremor
- Cogwheel rigidity ipsilateral to tremor
- Postural instability
- Gait: Short, quick steps
- Abnormally slow toe tapping

What is the diagnosis?

Diagnosis is **Parkinson disease**.

Presentation depends on stage of the disease.

Dx: For Boards, clue into the 3 main features: Tremor, bradykinesia, and rigidity. If the buzzwords "cogwheel rigidity" or "festinating gait" are in the question, then the diagnosis is Parkinson's (but you may not get those!).

Tremor is "pill-rolling," and always gets better with action. Rigidity is more pronounced on the side of the body with the tremor. "Festinating gait" means hurried small shuffles, often on tippy toes. Bradykinesia can be inferred from this patient's complaints of weakness, "dragging" feeling, and impaired dexterity.

Dementia is a long-term consequence in some cases.

Tx: Levodopa + carbidopa ± entacapone or tolcapone (severe) → can cause psychosis; ropinirole, pramipexole (mild–mod) → impulse problems; amantadine; anticholinergics (tremor); selegiline and rasagiline, but careful about serotonin syndrome if combined with tricyclics/SSRIs. Psychotic symptoms: Atypical antipsychotics, but careful of FDA advisory about increased mortality in demented elderly. Dose reduction of dopa agonists to improve psychosis can → neuroleptic malignant-like syndrome. Patients with Parkinson disease commonly develop dementia with Lewy bodies (DLB).

SCRIPT

Patient in his 30s develops:

- Long history of anxiety and agitation with poor social relationships
- Rapid, involuntary movements
- Declining problem-solving skills and poor orientation to goals
- Intact memory

What is the diagnosis?

Diagnosis is **Huntington disease**.

Reading this script, your first thought should be, "Wow, this person is young!" Your next thought should be, "This young person has dementia. What do I know that causes dementia in a young person who hasn't been to England or eaten any mad-cow beef?" The sole finding of dementia in a young person gives this diagnosis away, but add chorea to the script, and there is no alternative diagnosis.

Dx: Family history + clinical presentation + genetic test (+ HTT gene → Huntingtin protein). MRI: Atrophy of the caudate nuclei (box car ventricles); degree of atrophy correlates with dementia symptoms.

Tx: Tetrabenazine helps chorea, but has mood-depressing side effects and bradykinesia. Uniformly fatal.



SCRIPT

Otherwise healthy patient presents with acute onset:

- Sustained vertigo, regardless of position
- Nausea and vomiting
- Ataxia
- Positive head thrust test
- No tinnitus

What is the diagnosis?

Diagnosis is **vestibular neuritis**.

Consider any acutely dizzy patient on the Boards as having a posterior circulation stroke until proven otherwise. Therefore, it is reasonable if you guessed vertebrobasilar stroke for this script. This is not a posterior circulation stroke, though, because this patient has no other findings except vertigo (e.g., no diplopia or weakness), and she has a positive head thrust test. The head thrust test is where the patient's head is rapidly turned to the side, and visual fixation is assessed. Patients with vestibular neuritis are unable to maintain fixation—supporting evidence for neuritis. If the case was a presenting posterior circulation stroke, you would see more findings, such as speech or swallowing difficulties, weakness, or diplopia. This is not benign positional vertigo because BPV presents as intermittent episodes of vertigo triggered by head and body movement. This is not Ménière's because there is no tinnitus, hearing loss, or evidence of a recurrent nature.

Dx: Clinical + head thrust test.

Tx: Symptomatic relief with antihistamines and/or antiemetics; eventually self-resolves.

SCRIPT

Middle-aged patient with h/o HTN and hyperlipidemia presents 2 days after the acute onset of the following:

- “Dizziness” described as a sensation of movement
- Intermittent diplopia
- $\pm$ Weakness of both legs or hemiplegia
- $\pm$ Posterior neck bruit
- $\pm$ Ataxia

What is the diagnosis?

Diagnosis is **vertebrobasilar stroke**.

The terms "vertebrobasilar circulation" and "posterior circulation" are often used interchangeably. This is an important stroke syndrome because the workup is different from that of anterior circulation strokes. Atherosclerotic disease of the vertebral artery (proximal in the neck is the most common cause of posterior circulation strokes. Anytime you have a patient with "dizziness" or "vertigo," think about a posterior circulation stroke. So that you won't miss this diagnosis, look for discriminating Hx, signs, and symptoms in the question that would cause you to make an alternative diagnosis, such as multiple sensory deficits, tinnitus, and reference to the Dix-Hallpike maneuver (for BPV). True posterior circulation strokes often have more findings than only dizziness (e.g., diplopia, weakness, or ataxia), which help to differentiate stroke from vestibular neuritis.

Dx: CT or MRI of brain + CTA or MRA of posterior circulation (looks for ischemic lesions) + echocardiogram (looks for embolic sources).

Tx: Modification of lipids, blood pressure, and blood glucose $\pm$ anticoagulation (if embolic). Antiplatelet therapy if due to large vessel stenosis.



SCRIPT

Middle-aged patient with h/o palpitations presents with:

- Acute left-hand weakness
- Garbled speech
- Irregularly irregular rhythm
- Follows commands

What is the diagnosis?

Diagnosis is **middle cerebral artery stroke**.

This is a classic stroke syndrome that is often caused by a cardiac embolism. In this script, the patient has preexisting, undiagnosed A-fib and probably a cardiac thrombus that was a nidus for embolism. MCA strokes can present this way or also have some sensory loss and homonymous hemianopsia. The aphasia is part of the picture when the dominant hemisphere is involved. This case presents a Broca aphasia (expressive aphasia), but a case could also present a Wernicke aphasia, where the patient is unable to both comprehend and speak coherently.

Dx: CT or MRI of brain + CTA or MRA or Doppler U/S of carotids (looks for ischemic lesions) + echocardiogram (looks for embolic sources).

Tx: Modification of lipids, blood pressure, and blood glucose $\pm$ anticoagulation, if embolic. If not embolic, then antiplatelet therapy: Clopidogrel or ASA + dipyridamole.

SCRIPT

Patient with h/o hyperlipidemia and HTN presents with acute onset:

- Vertigo
- Hoarseness
- Dysphagia
- Dysarthria and dysphonia
- Mild Horner's
- Nystagmus
- Decreased pain and temperature on one side of face
- Inability to sit upright without tilting or leaning
- Ataxia

What is the diagnosis?

Diagnosis is **lateral medullary syndrome**.

LMS is also called Wallenberg syndrome, and it is a type of posterior circulation (vertebral) stroke that affects the cerebellum. It is not as frequent in clinical practice but easy to recognize on a Board exam if you remember that patients are very decompensated, but they have minimal or no motor weakness. The decompensation is completely due to the cerebellar and brainstem deficits. These areas of the brain controls balance, coordination, speech, and swallowing.

Dx: CT or MRI of brain + CTA or MRA of posterior circulation (looks for ischemic lesions) + echocardiogram (looks for embolic sources).

Tx: Modification of lipids, blood pressure, and blood glucose $\pm$ anticoagulation (if embolic). Patients need lots of supportive care because of significant impairment.

Misc: A patient with a cerebellar stroke should be admitted to the hospital because of the risk of swelling and herniation, even if the patient looks well at presentation.



SCRIPT

Patient with h/o uncontrolled HTN presents with 24 hours of:

- Worsening headache
- Vomiting
- Right- or left-sided weakness in both upper and lower extremities

What is the diagnosis?

Diagnosis is **hemorrhagic stroke**.

Cocaine use in a known hypertensive is another prominent risk factor that might be included in an exam question; hyperlipidemia is not a risk factor. Warfarin increases risk 2–5x. Most common sites for a hypertensive ICH: Pons, midbrain, thalamus, putamen, and caudate. Problems arise because of 3 factors: Clot causing impingement, ↑ ICP, and potential for herniation. Patients also can present with neck stiffness from meningeal irritation, if blood is in the ventricles. Cerebellar hemorrhages also occur and present with vomiting, ataxia, gaze palsy, and weakness of the face (no limb weakness!). Complete paralysis and coma is the presentation of pontine ICH.

Dx: Head CT (without contrast) or MRI; PT, PTT, and Plts if cause is unclear (esp. if patient lacks HTN); vascular evaluation if ICH associated with cocaine because many have underlying aneurysms/AVMs. In patients > 55 years of age, amyloid angiopathy is a common cause of cerebral hemorrhage, which is usually lobar.

Tx: ABCs; control fever and seizures; insulin drip to keep glucose 140–180; give vit K or protamine to reverse PT/PTT; factor replacement or Plts if actively bleeding. Control ICP and keep CPP 50–70. Tx SBP > 200 with IV meds. Tx SBP > 180 if ↑ ICP; use bolus or IV meds and keep CPP 60–80. Tx SBP > 180 with normal ICP with bolus or IV and target BP 160/90. It's controversial when/how to restart antiplatelet Rx or anticoagulation.



SCRIPT

Middle-aged or older patient presents to the ED with:

- Disorientation to the date and environment, repeatedly asking “How did I get here?” and “Where am I?”
- Unable to recall recent events within the past few hours to days
- Normal physical exam
- Normal cognitive testing with impaired delayed recall
- Regains orientation and memory after ~ 6–10 hours

What is the diagnosis?

Diagnosis is **transient global amnesia**.

A majority of these cases start in the morning hours, after the patient has arisen and has been behaving normally. You might have guessed stroke or TIA, but usually those patients have risk factors and the presentation includes other neurologic abnormalities in addition to disorientation. The only abnormality in this script is memory, and the key is that the memory is regained in a short period of 6–10 hours. No causes of dementia reverse in a short span of time. Patients with anoxia, drug intoxication, or delirium usually have global impairment, as opposed to exclusive impairment of memory.

Dx: Clinical, after other causes of impaired cognition are reasonably excluded; MRI with DWI to exclude other causes.

Tx: None required.



SCRIPT

Previously healthy 40–60-year-old smoker presents with acute onset:

- “Worst headache of life”
- Neck and shoulder pain
- Vomiting
- ↑ BP
- Nuchal rigidity
- Normal neurologic exam

What is the diagnosis?

Diagnosis is **spontaneous subarachnoid hemorrhage**.

Sometimes exertional activity (e.g., anger, exercise, or sex) will precipitate the headache. Most patients have an aneurysm or AVM, and the scenario may give you clues (e.g., FH of aneurysms or PCK disease, or use of cocaine). Smoking is the greatest RF; HTN also is one. A "sentinel," severe HA may precede the SAH by about a week. You might have guessed pituitary apoplexy if you remember that apoplexy can present with a "thunderclap" HA and meningismus. Apoplectic patients, however, usually have a history that suggests a preexisting pituitary mass (e.g., irregular menses, visual field defects, and/or chronic HAs).

Dx: Initially, noncontrasted CT (better than MRI); SAH shows up as a bright area because the blood acts as the contrast $\pm$ LP ($\uparrow$ OP with persistence of blood in tubes 1 $\rightarrow$ 4 and xanthochromia). Later studies include digital subtraction-, CT-, or MR-angiography to assess vasculature.

Tx: ABCs; control fever, seizures, and ICP; management of blood pressure is controversial, but do not use nitroprusside or nitroglycerin. Complications: Vasospasm after the event; rebleeding within 1st week after SAH. If patient deteriorates days after successful surgery, do angiography to evaluate for vasospasm, could also be therapeutic with intraarterial medication or angioplasty for severe vasospasm.



SCRIPT

Known alcoholic brought to the hospital for generalized decompensation and diagnosed with volume depletion and generalized malnutrition.

After fluid resuscitation, acutely develops:

- Confusion
- Lateral and conjugate gaze palsies
- Ataxia

What is the diagnosis?

Diagnosis is **Wernicke encephalopathy**.

Think about Wernicke's encephalopathy (WE) in any alcoholic who develops "dizzy crazy eyes" (all 3 at the same time) after receiving intravenous glucose. The condition is caused by acute thiamine (B₁) deficiency. In clinical practice, it may be difficult to distinguish whether the patient is ataxic from Wernicke's or intoxication, but the Board questions will be more precise, probably including all features of the triad. WE can occur when refeeding malnourished patients from other causes (e.g., anorexia, prolonged IV feeds, or starvation).

Dx: Clinical; progresses to death if not diagnosed and treated.

Tx: Thiamine replacement; patients should improve within hours to days.

Misc: WE can be precipitated by infusion of glucose to patients with thiamine deficiency. Always give thiamine before intravenous fluids to susceptible patients.



SCRIPT

Cheerful alcoholic presents with the following:

- Loss of recent memory
- Fantastic stories regarding the events of daily life
- No insight into memory impairment
- Normal sensorium
- Normal cognition and socialization

What is the diagnosis?

Diagnosis is **Korsakoff syndrome**.

Korsakoff's is a disease of anterograde and retrograde memory impairment that most often occurs after Wernicke's encephalopathy. In addition to significant recent memory impairment, patients with Korsakoff's often construct fantastic stories that couldn't possibly be true, especially considering their generalized state of debilitation or status in life (termed "gleeful confabulation"). Memory impairment and fantastic stories in an alcoholic = Korsakoff's.

Dx: Clinical.

Tx: Supportive; patients usually do not recover function.



SCRIPT

Male patient presents with gradual development of:

- Repeatedly dropping objects and trouble performing tasks using fingers on the same hand
- Slurring of speech at the end of the day
- Difficulty swallowing thin liquids
- Atrophy of hands, shoulder muscles, or thighs
- Fasciculations

What is the diagnosis?

Diagnosis is **amyotrophic lateral sclerosis (Lou Gehrig disease)**.

ALS is a progressively fatal neurodegenerative disorder. This script presents the most common early disease manifestation: Asymmetric hand weakness. An exam scenario could present a patient with unilateral leg weakness, manifesting as foot drop, or shoulder weakness with difficulty performing tasks that require raising the arm overhead. The main identifying feature is the combination of upper (dysarthria, dysphagia) and lower (weakness, fasciculations) motor neuron disease. The fasciculations help you know the case is not myasthenia.

Dx: Clinical history of progression and physical exam + electromyography and nerve conduction studies. MRI excludes other diagnoses. Exclude myasthenia by showing absence of acetylcholine receptor and anti-MuSK antibodies. LP helps exclude causes of chronic meningitis. Exclude HIV and Lyme with serum tests.

Tx: Supportive; care should include discussion of end-of-life issues, including nutritional and ventilatory needs.

Misc: Causes of UMN and LMN findings in the same patient: ALS, syringomyelia (LMN in upper limbs and UMN in lower), neurosyphilis and tabes dorsalis, subacute combined degeneration of the cord (vit B₁₂), cervical spondylosis, and Friedreich ataxia.



SCRIPT

Patient presents with chronic:

- Neck pain
- Arm pain and paresthesias that extend into shoulder
- No sensory loss
- $\pm$ Decreased reflexes in the arm
- Normal shoulder exam
- $\pm$ Pain and paresthesias with extension and rotation of the neck to the side of the arm pain ("Spurling maneuver")

What is the diagnosis?

Diagnosis is **cervical radiculopathy**.

Cervical spondylosis is caused by degeneration of the cervical spine marked by deterioration of the discs and vertebral joints and bodies with osteophyte formation. Sometimes, nerve roots become compressed and cervical radiculopathy develops. Other causes of cervical radiculopathy include cervical disc herniation, infections (Lyme, zoster), infarction, infiltration (tumor or granuloma), and demyelination (MS). The Spurling maneuver is specific, but not very sensitive, for cervical radiculopathy, so it may not be included in the clinical scenario. If the pain and paresthesias are caused by a cervical disk herniation, the question might include a h/o trauma such as an MVA.

Dx: Clinical $\pm$ MRI (plain films don't help, unless you suspect a traumatic fracture) and nerve conduction studies.

Tx: Radicular symptoms without motor weakness are managed conservatively with analgesics, physical therapy $\pm$ oral or injection corticosteroids. Surgery is reserved for refractory pain and/or motor weakness.

Misc: Lhermitte's sign (flexion of neck leading to extremities tingling) is seen in: Cervical spondylosis, MS, vit B₁₂ deficiency, and transverse myelitis.

SCRIPT

Patient presents with:

- Bilateral, intermittent pain and paresthesias in the first 3 fingers and half of the 4th digit that wake him from sleep
- Clumsiness in the hands
- $\pm$ Atrophy of thenar eminence

What is the diagnosis?

Diagnosis is **carpal tunnel syndrome**.

Many patients present with bilateral disease, so don't assume a cord lesion because both hands are involved. Thenar eminence atrophy is not present in every case.

Dx: Clinical + electromyography and nerve conduction studies.

Tx: Wrist splints with steroid injection for persistent symptoms. Surgical release is used in refractory cases.

SCRIPT

Cyclist patient presents with:

- Pain and paresthesias over the ring and pinky fingers
- $\pm$ 4th and 5th digit interosseous weakness

What is the diagnosis?

Diagnosis is **ulnar neuropathy**.

Bicyclists and people who lean on their elbows are at increased risk. Bicyclists have a higher risk because of repeated shock up the arm that occurs while holding handlebars and riding over bumpy roads.

Dx: Clinical ± electromyography and nerve conduction studies.

Tx: Traumatic injury resulting in ulnar neuropathy should be referred to a hand surgeon for surgical evaluation. Young and healthy patients with significant motor weakness should also be referred for surgical consideration. Elderly and sick patients should avoid leaning on the elbows and excessive elbow flexion. Splint the elbow at night to avoid flexion.

SCRIPT

Patient with h/o hip fracture presents with chronic:

- Unilateral pain and paresthesias that radiate from the lower buttock to the back of the thigh
- $\pm$ Weakness in the hamstrings
- Normal hip range of motion and knee extension
- Normal sensation in the calf and foot

What is the diagnosis?

Diagnosis is **sciatic nerve compression**.

Know that hip trauma is the most common cause of sciatica (e.g., dislocation, fracture, or THR). Femoral neuropathy sometimes is seen as a complication of long-standing diabetes but presents with pain, paresthesias, and weakness in the quadriceps muscle and sensory loss over the anterior thigh (a different distribution of pain and weakness than what is seen with sciatica).

Dx: Clinical; electromyography is not as sensitive in this neuropathy as in others, showing abnormalities only when disease is severe.

Tx: Analgesics.

SCRIPT

Patient with symmetric, polyarticular arthritis in the wrists and MCPs, accompanied by nodules over the elbows, presents with:

- Dorsiflexion weakness, manifesting as foot slapping and foot drop
- Pain and paresthesias in the first 3 fingers and 1/2 of the 4th

What is the diagnosis?

Diagnosis is **mononeuritis multiplex**.

MM is caused when nerves from different parts of the body are damaged, usually by the same process. Think MM when you see a disease of multiple peripheral nerves (e.g., foot drop and carpal tunnel). Foot drop (dorsiflexion weakness) is usually the first sign, but the weakness might be observed only by the clinician, as patients often do not recognize the problem. MM is indicative of underlying disease, usually vasculitis. SLE and RA are frequent causes.

Dx: MM typically is only one clinical feature out of many symptoms of vasculitis. MM is appreciated clinically, but the underlying diagnosis of vasculitis is best accompanied with biopsy of other affected organ systems.

Tx: Treat the vasculitis.



SCRIPT

Otherwise healthy patient with recent self-limited diarrheal illness presents with 3-day h/o:

- Alternating tachycardia and bradycardia
- Alternating hypertension and hypotension
- Progressive ascending weakness, progressing over ~ 14 days
- Normal sensation
- Absent knee and ankle reflexes
- CSF: ↑ Protein and normal WBC

What is the diagnosis?

Diagnosis is **Guillain-Barré syndrome**.

GBS is a progressive, bilateral, ascending paralysis without a sensory component (or only a mild one) and with loss of reflexes. Facial weakness occurs in many, and oculomotor weakness in some. Up to 30% of patients eventually require ventilatory support. Remember 20-30-40 rule for vent assistance. VC < 20mL/kg, MIP less negative than -30 cmH₂O and MEP < 40 cmH₂O. Autonomic dysfunction occurs in up to 70% and is an important cause of mortality. Remember the association of GBS with antecedent *Campylobacter* infection!

Dx: Clinical suspicion + CSF analysis + EMG and nerve conduction studies + anti-GQ1b antibodies (if Miller-Fisher variant).

Tx: Supportive (including mechanical ventilation) with attention to monitoring of blood pressure and fluid status + plasma exchange or IVG (but not both). Do not use corticosteroids. The majority of patients will completely recover. It is recommended to abstain from vaccines within the 1st year after illness. 10% have disabilities at 1 year.

SCRIPT

Healthy woman in her 3rd trimester of pregnancy presents with acute onset of:

- Unilateral facial droop that includes the forehead, eye, and mouth

What is the diagnosis?

Diagnosis is **Bell's palsy**.

The characteristic unilateral facial droop of Bell's palsy is easy to diagnose. You might have guessed a central lesion, but those lesions spare the forehead and affect only the eye and mouth. Don't forget about the association between specific pathogens and Bell's palsy, especially acute HIV infection, infection with herpes simplex virus (both primary and reactivation) and varicella zoster, and early Lyme disease. Many patients present during the 3rd trimester of pregnancy. Diabetes is also a risk factor and could be included in a question.

Dx: Clinical history and exam + recovery of some function within 6 months. Vesicles assist in diagnosing HSV or zoster. Evaluate for other causes if the patient lacks improvement within 4 months or acute onset. Use EMG, nerve conduction studies, and high-resolution CT scan.

Other causes of CN VII palsy: HIV, Lyme disease (can be bilateral), GBS (can be bilateral), neurosarcoidosis, and parotid tumors.

Tx: Ocular hygiene (artificial tears and ophthalmic ointment q hs) + oral corticosteroids x ~ 1 week started within 72 hours. Antivirals can be prescribed if evidence exists of infection, but efficacy is controversial.

SCRIPT

Patient presents after a raucous night of revelry with:

- Unilateral wrist drop
- Unilateral weakness of finger extensors
- Dorsal hand paresthesias
- Normal triceps strength

What is the diagnosis?

Diagnosis is **radial neuropathy** ("Saturday night palsy").

Wrist drop is sometimes seen with a lesion in the CNS, but those lesions also result in triceps weakness and ascending sensory abnormalities. This entity is associated with alcohol use, when patients are inebriated and pass out with their arm hanging over the edge of a piece of furniture.

Dx: Electromyography and nerve conduction studies.

Tx: Physical therapy, wrist splint, and analgesics.



SCRIPT

Patient with long-standing T2DM presents with gradual onset of bilateral:

- Pain, burning, and buzzing sensations in the toes, feet, and fingertips
- Decreased proprioception and vibratory sense
- Decreased sensation to fine touch and pinprick
- Decreased ankle reflexes
- Normal motor strength in the feet

What is the diagnosis?

Diagnosis is **diabetic sensorimotor polyneuropathy**.

The script presents a classic peripheral polyneuropathy in a stocking-glove distribution. In a diabetic, the cause is usually diabetes. A question might include the neuropathy as part of the relevant clinical history introducing foot ulcers and diabetic neuroarthropathy (previously termed "Charcot joints"). With time, the paresthesias evolve into weakness and gait abnormalities.

Dx: Clinical $\pm$ electromyography and nerve conduction studies; exclude vitamin deficiencies (B_1 and B_{12}) and toxins, such as alcohol.

Tx: Strict glycemic control prevents further deterioration but does not reverse symptoms. For painful neuropathy, options include amitriptyline, duloxetine, venlafaxine, pregabalin, valproic acid, capsaicin cream, lidocaine patches, and alpha-lipoic acid. Efficacy of the widely-used gabapentin is not certain.



SCRIPT

Diabetic patient with h/o gastroparesis, treated with metoclopramide, presents with:

- Akathisia, such as lip smacking and toe tapping
- Chorea, including tongue protrusion
- Athetosis

What is the diagnosis?

Diagnosis is **tardive dyskinesia**.

You may have forgotten the association of metoclopramide with tardive. If the script had included a schizophrenic patient with a history of haloperidol use (a neuroleptic), the Dx is easily recognizable. You might also loosely associate neuroleptic meds with neuroleptic malignant syndrome and incorrectly guess NMS for every clinical scenario related to use of a neuroleptic. Be careful not to do that! NMS can be caused by neuroleptics, and a similar syndrome can result when patients with Parkinson's acutely stop their meds. Tardive, however, is not associated with hyperthermia, and it results from chronic use of neuroleptics (not withdrawal of). Tardive can also present as dyskinesias of the upper body; e.g., torticollis, rocking, shoulder shrugs, or tapping of the feet or fingers.

Dx: Clinical.

Tx: Stop the offending medication, although this does not always abbreviate the symptoms; do not use metoclopramide longer than 12 weeks in any patient.



SCRIPT

Young male in early 20s presents with several years:

- Involuntary motor movements of head shaking and shoulder shrugging, associated with an urge to move and relief after the movement
- Echolalia
- Ability to suppress the movements in many situations with concentration
- Obsessive ruminating over specific ideas
- Normal neurologic exam, except for spontaneous movements

What is the diagnosis?

Diagnosis is **Tourette syndrome**.

Tourette's is motor and vocal tics that begin in childhood. It is safe to associate echolalia and coprolalia with Tourette's and to make that diagnosis when you see those features in a scenario. Look for this Dx in a young male, usually before age 25. Unlike in other movement disorders (e.g., chorea), patients with Tourette's can temporarily suppress their tics. The majority of patients have a comorbid disease, such as ADHC, OCD, a learning disorder, or conduct disorder.

Dx: Clinical.

Tx: Dopamine agonists (e.g., fluphenazine, pimozide, tetrabenazine); clonidine, or botulinum toxin can be injected into muscles in patients with refractory tics. Comorbid disorders should also be treated.

SCRIPT

Middle-aged patient presents with:

- Bobbing head movements that occur at rest that are somewhat inhibited by drinking alcohol
- Family history of same

What is the diagnosis?

Diagnosis is **essential (postural) tremor**.

You might have guessed Parkinson's disease if you associated a resting tremor with Parkinson's. Although essential tremor occurs when patients are at rest, it is not considered a "resting tremor," but a postural one. It is very rare for Parkinson's to have a tremor of the head—more likely, you might see a tremor of the lips or chin, but not the traditional head bobbing of the postural tremor. Improvement with alcohol intake is a key element of this script and gives you the diagnosis. Essential tremor can occur in the hands and arms, and it can involve the head and voice. It is made worse with goal-directed actions, which is tested with the finger-to-nose part of the neuro exam.

Dx: Clinical. Responds to alcohol!

Tx: Propranolol or primidone; gabapentin and topiramate are alternatives.

SCRIPT

Runner presents with gradual onset:

- Pain and paresthesias between the 3rd and 4th toes with standing and walking, reproducible with palpation

What is the diagnosis?

Diagnosis is **Morton neuroma**.

Interdigital neuromas are caused by swelling and scar on the nerves that run between digits. In practice, there are a couple of other unusual entities that can present this way, such as an intermetatarsal bursitis, but that is pretty specialized to ask on a Board exam. Expect the Boards to be checking your knowledge of Morton neuroma if they mention pain between 2 toes.

Dx: Mulder's sign = clicking evidence when squeezing the metatarsal joints and palpating the interdigital space.

Tx: Metatarsal support or shoe inserts + strength exercises for foot muscles. Treatment should be bilateral to keep the pressure of the interventions evenly distributed. Corticosteroid injections can be used in refractory cases. Surgery is used in extreme cases.

SCRIPT

20–40-year-old female with h/o optic neuritis presents with repeated episodes of the following that are sometimes precipitated by exercise and fever. Other findings include:

- Fatigue
- Asymmetric, motor weakness with episodic paresthesias
- Increased leg spasticity and sensations of cold
- Abnormal horizontal gaze
- MRI: Multiple cerebral and spinal plaques
- CSF: $\uparrow$ WBC < 75 cells/ μ L (monos), $\uparrow$ intrathecal IgG, oligoclonal bands

What is the diagnosis?

Diagnosis is **multiple sclerosis**.

Females > Males. Vit D deficiency is associated with risk. Most common Sxs are fatigue, weakness, spasticity, and optic neuritis. "Uhthoff's symptom" is worsening of the neuro symptoms with an increase in body temp, such as with exercise or fever. Lhermitte's symptoms are shocklike sensations that move down the back into the legs. "Internuclear ophthalmoplegia" is the buzz phrase that describes poor adduction of one eye with nystagmus of the other abducting eye as the patient attempts horizontal gaze. It is seen often in MS when a lesion is in the medial longitudinal fasciculus.

Dx: Dx requires evidence of CNS disease, either clinical or clinical + radiographic, that is evident in both, more than 1 space in the CNS, and more than 1 point in time. Typical MS areas are: Periventricular, juxtacortical, infracortical, and cord. Supporting diagnostic tests include evoked potentials and CSF analysis.

Tx: Corticosteroids shorten severe acute attacks; mild attacks usually are not treated. Chronic treatment includes immunomodulation and is managed by neurologists. Natalizumab has been associated with reactivation PML.



SCRIPT

20–30 y/o female presents with gradual onset:

- Muscle weakness after performing repetitive movements (brushing hair, putting dishes away in high cabinets, or walking up stairs, especially at the end of the day)
- No muscle pain
- Decreased strength with repeated contraction of quadriceps
- Normal sensation and reflexes
- Normal CPK

What is the diagnosis?

Diagnosis is **myasthenia gravis**.

If you're unsure of the specifics of myasthenia, you might have guessed any of several myasthenia mimics, such as myositis (CPK is usually not normal, except in steroid myopathy), Lambert-Eaton (muscle weakness improves with use), or polymyalgia rheumatica (PMR presents with pain, not weakness).

Dx: Anti-acetylcholine receptor antibodies (92% sensitive in generalized and 60–70% in ocular) $\pm$ anti-MuSK antibodies (may be present in 38–50% of generalized disease that is anti-AchR negative) + repetitive nerve stimulation (shows decremental response). MRI or CT of mediastinum to evaluate for thymoma. 15% have thymoma and 65% have thymic hyperplasia. Ice pack test for patients with ptosis only (80% sensitivity). Note that reflexes are preserved in MG.

Tx: Pyridostigmine + thymectomy (even if tumor is absent and age 15–55 years) $\pm$ immunomodulation (prednisone, mycophenolate, azathioprine, cyclosporine, tacrolimus, or cyclophosphamide); plasmapheresis or IVIG can be used acutely in severe patients.

Misc: MG is associated with thymoma, hyperthyroidism, and other autoimmune disorders, so these should be excluded. Certain drugs should be avoided, including aminoglycosides, quinolones, macrolides, beta-blockers, quinine, chloroquine, mefloquine, magnesium, and certain anesthetics (e.g., curare, vecuronium, procaine).



SCRIPT

Middle-aged male smoker with chronic cough presents with several months of:

- Symmetric, proximal muscle weakness, ptosis, and diplopia
- Dry mouth
- Erectile dysfunction
- Isometric contraction of the quadriceps muscles → improved motor strength and increased knee reflexes
- Sustained gaze at the ceiling → eyelid elevation
- Decreased or absent reflexes
- Normal CPK

What is the diagnosis?

Diagnosis is **Lambert-Eaton syndrome**.

LE syndrome is associated with malignancy, usually small cell lung cancer and can occur before the tumor has been discovered. The clinical presentation of LE is proximal muscle weakness without atrophy, autonomic dysfunction, and ptosis. The weakness is similar to myasthenia until some specific bedside testing is performed, aimed at determining if repeated contraction causes improved strength, which is a defining feature of LE syndrome. In myasthenia, sustained upward gaze leads to muscle fatigue and ptosis, and repeated muscle stimulation leads to fatigue and weakness. As with myasthenia, sometimes LE is confused with myositis (but myositis has an increased CPK) and polymyalgia rheumatica (but PMR presents with pain, not weakness).

Dx: Antivoltage-gated calcium channel antibodies + repetitive nerve stimulation (shows incremental response). Note that reflexes are depressed in LE syndrome.

Tx: Remove the malignancy + guanidine $\pm$ 3,4-diaminopyridine + pyridostigmine + plasmapheresis or IVIG $\pm$ immunomodulators (e.g., prednisone, azathioprine, mycophenolate, rituximab).



SCRIPT

Healthy, young patient in his 20s presents with:

- Inappropriate sleeping, although he sleeps several hours at night and feels rested upon wakening
- Sleepiness improves after a nap, temporarily
- Paralysis for ~ 2 minutes after awakening
- Frequent scary hallucinations while falling asleep or before full awakening
- Transient episodes of severe weakness, with intact consciousness, during times of intense emotion, especially laughter
- BMI < 25

What is the diagnosis?

Diagnosis is **narcolepsy**.

If a Board question gives you cataplexy (drop attacks with intact consciousness or weakness, as presented in this script), then it is safe to guess narcolepsy as the Dx because cataplexy is almost exclusive to narcolepsy. But a question might not include cataplexy since 40% of narcoleptics do not experience it. Many features differentiate narcolepsy from sleep apnea: Restfulness upon awakening, sleep paralysis, cataplexy (if present), and improvement with naps.

Dx: Polysomnogram and multiple sleep latency test.

Tx: Avoid drugs that cause drowsiness or insomnia + two 20-minute naps during the day to help remain rested + modafinil. Because of the propensity for addiction, methylphenidate and amphetamines are less used than modafinil.

SCRIPT

55-year-old patient brought in by his wife. He is acting a little odd: Sees things that are not there; screams in his sleep; not very attentive to conversation; seems in and out of alertness; sometimes stares. His executive function is impaired. His gait is slow and shuffling, and he has rigidity on physical exam.

What is the diagnosis?

Diagnosis is **dementia with Lewy bodies (DLB)**.

The key points here are: Hallucinations, which can be vivid; altering levels of attention; impaired executive function; and parkinsonism features. Syncope and LOC can occur. They also act out their dreams!

Dx: Psychiatric symptoms are a big clue to this diagnosis. Dementia occurs in ~ 80% of patients with Parkinson's—usually in the setting of well-established disease. With DLB, the dementia occurs with onset, or even before, parkinsonian signs.

Tx: Patients with DLB are extremely sensitive to the side effects of antipsychotics! Treat hallucinations and psychosis with newer agents such as clozapine. Treat the parkinsonism with levodopa. No specific pharmacologic treatment is available, although cholinesterase inhibitors and NMDA receptor blocks such as memantine can be tried.

SCRIPT

74-year-old man with DM and HTN presents with 2 hours of right-sided hemiparesis, which has completely resolved. Patient had associated expressive language difficulties. His speech is back to normal, and his neuro exam is normal. A noncontrast CT head is negative for bleed or infarct.

What is the diagnosis?

The diagnosis is **TIA**.

Transient neurologic symptoms and signs with complete recovery and no evidence of infarct on imaging. This is consistent with a 2009 AHA/ASA scientific statement defining TIA. No more emphasis on a < 24 hour duration. TIA signals impending danger: ~ 10% suffer a stroke within 90 days with half being within 48 hours. Also, ~ 3%/year incidence of cardiac complications. Patients with TIA should have imaging within 24 hours (i.e., ASAP after their symptoms) to determine if any infarction is present. Also order CT or MRA angiography of intracranial and neck vessels, echo, and blood work: chemistries, BS, lipids, CBC. ECG to rule out A-fib.

Oncology

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SCRIPT

Male, age 20–40, with h/o single undescended testicle presents with:

- Dyspnea, cough, and a neck lump
- Supraclavicular lymphadenopathy and
- Bilateral dullness to percussion of the lungs
- Egophony
- Coarse crackles

What specific additional examination should be performed?

Additional examination of the testes should be performed.

Always think about testicular cancer in a young male with evidence of metastases, including supraclavicular lymphadenopathy and pulmonary consolidation. A case could present a simple testicular mass, but that might be too easy. The question may ask if you know that testicular cancer is the most common soft tissue cancer in males in this age group, especially if cryptorchidism is present (or the patient has had an orchiopexy). The scenario may include α -fetoprotein and β -hCG levels, which are increased in a majority of patients with localized nonseminomatous germ cell tumor pathology. They usually are not increased in seminomas.

Dx of testicular cancer: Ultrasound + radical inguinal orchiectomy (to determine tumor type) with retroperitoneal lymph node dissection + α -fetoprotein, β -hCG, LDH + TNM staging with CXR, CT abdomen and pelvis (and chest if pulmonary disease suspected).

Tx: Depends on staging; lymph node resection $\pm$ chemotherapy based on stage and functional status + surveillance of tumor markers and physical exam.



SCRIPT

Male patient older than 50 years has:

- An irregular prostate nodule on digital rectal exam
- PSA < 4 ng/mL

What is the correct recommendation?

The recommendation is to **perform a prostate biopsy**.

Recognize that any palpable prostate abnormality should be biopsied, regardless of PSA level, because the PSA test suffers from a lack of both sensitivity and specificity. Some patients with prostate cancers have normal PSA levels.

Dx of prostate cancer: Transrectal ultrasound-guided prostate biopsies + serum PSA + TNM staging with imaging (MRI is best) and Gleason score (based on differentiation of cancer cells; highest number = least differentiate) ± bone scan.

Tx depends on extent of disease: Radical prostatectomy ± lymph node dissection ± radiation therapy/brachytherapy with neoadjuvant hormone therapy ± antiandrogen chemotherapy + management of bony disease (pain, hypercalcemia, fractures).



SCRIPT

Patient presents with:

- Intermittent episodes of wheezing and flushing, often provoked by exercise and ingestion of alcohol or cheese
- Palpitations
- Watery diarrhea

What is the diagnosis?

Diagnosis is **carcinoid syndrome**.

Carcinoid syndrome is a collection of symptoms associated with the release of vasoactive mediators by a carcinoid tumor; the primary tumor is usually in the GI tract. The syndrome only occurs when the GI tumor has metastasized to the liver and, in the much less common, bronchial carcinoid (which are associated with more intense flushing of longer duration + bronchospasm). The clinical scenario could include features of pellagra (skin rash, glossitis, angular cheilitis, confusion) because the tumor uses up dietary tryptophan to make the vasoactive mediators, thus leaving no tryptophan available to make niacin. Many patients with nonmetastatic disease do not present with carcinoid syndrome and instead present with symptoms due to the enlarging tumor.

Dx: Urinary 5-HIAA (increased > 8 mg/d when a tumor is present) + imaging (CT, MRI, PET).

Tx: Of carcinoid syndrome = avoid triggers for flushing + nicotinamide supplementation + bronchodilators prn + loperamide prn diarrhea. SSRIs are used in refractory cases. Of non-metastatic carcinoids = surgical resection. Of carcinoids with mets = poor prognosis; modalities include surgical resection, CXT, long-acting somatostatin analogues, embolization of tumor, and types of radiation.

SCRIPT

Middle-age female with a 2-month h/o burning and itching sensations of the nipple presents with:

- Unilateral eczema-like rash that began on the nipple and spread to the areola
- Yellowish nipple discharge

What is the diagnosis?

Diagnosis is **Paget disease of breast (also called mammary Paget disease)**.

Any unilateral nipple discharge, especially if associated with any overlying skin changes, in a non-lactating female is suspicious for Paget disease. The rash can be scaly, like eczema, but also vesicular or ulcerative. You may have guessed inflammatory breast cancer. IBC usually is not associated with isolated nipple changes but more often presents as inflamed skin with a peau d'orange quality, resembling mastitis, and nipple retraction occurs because of surrounding edema. If you guessed mastitis, you probably didn't pay attention to the patient's age. Never guess mastitis in a non-lactating female, especially if she is middle-age. Half of the patients with Paget's will have a palpable breast mass, so the clinical scenario may or may not include the mass. Know that the skin changes with Paget's can spontaneously improve, then recur, so don't let that clinical history dissuade you from this diagnosis. Only rarely does eczema present similarly, so that scenario is unlikely to occur in a Board question. Histologically, Paget's is caused by intraepithelial adenocarcinoma within the nipple's epidermis.

Dx: Mammography + full-thickness nipple biopsy (wedge or punch) with immunohistochemistry ± evaluation of the axilla.

Tx: Based on type and extent of breast cancer.



SCRIPT

Lactating female presents with a 1-week h/o:

- Subjective fever
- Unilateral breast pain and swelling
- Cracking of the ipsilateral nipple
- Erythematous, tender, swollen area of the breast

What is the diagnosis?

Diagnosis is **mastitis**.

The history of lactation and the systemic symptoms of fever help you exclude breast cancer and a plugged duct as causes.

Dx: Clinical + ultrasound (if suspect abscess that would need drainage).

Tx: Analgesics + support to continue breastfeeding + oral antistaphylococcal antibiotics (dicloxacillin or cephalexin) or clindamycin, if allergic to beta-lactams.



SCRIPT

Childless, obese female, age 45–60 years, FH of breast cancer presents with:

- Pelvic discomfort, early satiety, and bloating
- Abdominal exam: Shifting dullness
- Pelvic exam: Irregular, fixed, adnexal mass
- ↑ Serum CA-125
- + *BRCA* mutation

What is the diagnosis?

Diagnosis is **ovarian cancer**.

Although the script sounds extreme, we included in it most of the risk factors for ovarian cancer. Nulliparity, obesity, and either *BRCA1* or *BRCA2* mutations. Remember that patients with Type II Lynch syndrome (hereditary non-polyposis colon cancer) are also at increased risk for ovarian cancer without *BRCA* mutations. Advanced ovarian cancer, not early disease, is associated with increased CA-125 levels. Mets to the ovary can occur from GI and breast cancers.

Dx: Unilateral salpingo-oophorectomy is recommended to evaluate unilateral tumors, with hysterectomy and pelvic node and intraabdominal sampling if malignancy is discovered on frozen section.

Tx: Prophylactic oophorectomy by age 40, after child bearing, for women with *BRCA* mutations. Screening with CA-125 is not recommended. For known malignancy, debulking improves prognosis + platinum-based CXT. Survival correlate with stage of disease at diagnosis (1–5% at 5 years if stage IV).



SCRIPT

Patient with known multiple myeloma on zoledronic acid for hypercalcemia presents with:

- Failure to heal at a site of recent dental extraction
- Loosening of adjacent molars

What is the diagnosis?

Diagnosis is **osteonecrosis of the jaw**.

Remember the association between chronic use of high-dose intravenous bisphosphonates and development of osteonecrosis of the jaw (mandible and/or maxilla). The case could present loosening of teeth, soft tissue swelling, failure to heal recent dental work, pain, and drainage. Cancers commonly associated are myeloma and metastatic breast. The history of zoledronic acid use is key, but the case could also include pamidronate. Osteonecrosis is rare with use of the oral agents. Send the patient who is scheduled to take an intravenous bisphosphonate long-term to a dentist for a pre-treatment assessment and cleaning. Avoid tooth extractions and other major dental procedures while on the bisphosphonate, but routine cleanings and fillings are okay.

Dx: Clinical.

Tx: Conservative treatment with debridement, antibiotics, and chlorhexidine mouth rinses. It's controversial whether or not to continue the bisphosphonate.



SCRIPT

Tobacco smoker presents with 2-month h/o:

- Dyspnea and cough
- Facial swelling and sensation of fullness of the head, especially when bending over
- Distended neck and chest wall veins

What is the diagnosis?

Diagnosis is **superior vena cava syndrome**.

The case could include the same presentation in the setting of a central venous catheter (especially in the subclavian location) or could include a history of a hypercoagulable state. The cancers you might see in the case could be lung cancer (small cell or non-small cell), lymphoma, or metastatic disease. Know that laryngeal edema or respiratory compromise are serious presentations.

Dx: Clinical + CXR (may show widening of the superior mediastinum) + CT chest (shows clot in SVC or extrinsic compression due to malignancy).

Tx: Temporary relief with head elevation, diuretics, and oxygen; systemic glucocorticoids are used in lymphoma (not useful in lung cancer); XRT $\pm$ CXT for lung cancer and non-lymphomatous metastases. Surgery is sometimes used if the cause is benign. Fibrinolytics sometimes can be used in SVCS due to a clot from a central venous catheter in order to save the venous access.



SCRIPT

Afebrile patient with known prostate cancer and a non-reactive TB skin test presents with a 1-month h/o:

- Progressively worsening lower back pain
- Progressive bilateral lower extremity weakness
- Bilateral paresthesias without urinary or fecal incontinence
- ↓ Hgb, Hct, albumin
- ↑ ESR

What is the diagnosis?

Diagnosis is **cord compression**.

Back pain with radicular symptoms and weakness is cord compression until proven otherwise, especially in the patient with known cancer. Cancers with common vertebral metastases are breast, lung, and prostate, but be suspicious when any patient with known cancer presents with back pain and neurologic changes. If the scenario does not contain any h/o cancer, still worry about this patient because of the objective weakness; but the differential diagnosis is broader, including vertebral osteomyelitis ± epidural abscess and myeloma. Myeloma usually is obvious based on additional labs that show a hyperchloremic acidosis with hypokalemia due to Type 2 RTA, chronic increase in the serum creatinine, and hypercalcemia.

Dx: Clinical + plain radiographs (look for erosion of pedicles—earliest sign; normal films do not exclude) + full-length cord MRI.

Tx: Empiric dexamethasone at suspicion of cord compression; add XRT after diagnosis.

Misc: Once paraplegia develops, most patients do not recover function.



SCRIPT

Patient with Burkitt's presents with the following pretreatment labs:

- $\uparrow$ LDH $> 2\times$ normal
- $\uparrow$ Uric acid > 7.5 mg/dL
- $\uparrow$ Creatinine > 1.5 mg/dL

He receives IVF, allopurinol x 24 hours and cytotoxic chemotherapy, then develops:

- Lethargy, nausea, diarrhea, muscle spasms, and cramps
- $\uparrow$ K and PO_4 , $\downarrow$ Ca, $\uparrow$ creatinine, $\downarrow$ blood pH

What is the diagnosis?

Diagnosis is **tumor lysis syndrome**.

There are 2 clues that the patient is at risk for tumor lysis: A tumor with a large cell burden (Burkitt's) and evidence of already-increased cell turnover (increased LDH and uric acid). TLS is more common with leukemia/lymphomas than with solid tumors. The muscle spasms and cramping are caused by the hypocalcemia. Hyperkalemia is the most dangerous electrolyte abnormality, predisposing to ventricular arrhythmias. Recognize that prophylaxis with allopurinol does not entirely prevent tumor lysis, and allopurinol does not lower preexisting hyperuricemia.

Dx: Clinical.

Tx: Prevent with IV hydration + urinary alkalinization + allopurinol or rasburicase. Rasburicase is expensive and associated with bronchospasm and hypotension, but it is recommended over allopurinol for high-risk patients because it directly lowers uric acid load. Rasburicase is contraindicated in patients with G6PD deficiency. Treat TLS with hydration and bicarbonate infusion, but, while raising the blood pH, watch out for worsening hypocalcemia and precipitation of calcium phosphate in the urine. Hemodialysis often is used early.



Pulmonary Medicine

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SCRIPT

Patient presents 2 years after significant inhalation exposure to pool chemicals with:

- Chronic productive cough x months to years
- PE: Crackles at the bases
- Sputum Gram stain: Multiple gram-positive and gram-negative organisms
- Sputum culture: Gram-negative enterics, such as *Proteus*

What is the diagnosis?

Diagnosis is **bronchiectasis**.

Recognize that inhalation injury is one of the factors that predispose a patient to bronchiectasis. Normal lung is not colonized by multiple organisms. If no history of inhalation injury is included in the scenario, think about cystic fibrosis and obstructing lesions. You might have guessed RADS for this answer (reactive airways dysfunction syndrome). RADS is a type of occupational asthma that occurs after inhalation of specific irritants. Symptoms of RADS are similar to asthma; the airways are not typically colonized with organisms unless an element of bronchiectasis exists.

Dx: High-resolution or multi-detector helical CT of the chest + thorough evaluation for underlying immunodeficiency + PFTs (to assess function of lungs).

Tx: Culture-directed antimicrobials + chest physiotherapy.

Misc: Be aware of 3 organisms that cause these patients serious problems—*Pseudomonas*, MAC, and *Aspergillus*.



SCRIPT

Young patient with PMH of recurrent sinusitis and pneumonia presents with:

- Chronic exertional dyspnea
- Cough with purulent sputum
- Sputum Gram stain: Gram-positive cocci in clusters and gram-negative rods
- Sputum grows: *S. aureus*

What is the diagnosis?

Diagnosis is **cystic fibrosis**.

Normal lungs are not colonized by multiple organisms. Colonization suggests the presence of necrotic lung (bronchiectasis). Bronchiectasis is usually caused by some event or an underlying disease process, such as an immunodeficiency or a chronic obstruction. In a young patient, lacking any obvious cause in the clinical history, think cystic fibrosis.

Dx: Clinical suspicion + sweat chloride test + CF gene testing.

Tx: Supportive + culture-directed antimicrobials + bronchodilators + inhaled DNase I or hypertonic saline + chest physiotherapy. For patients with a *G551D* gene mutation, ivacaftor is approved—an oral drug that restores the function of the mutant protein. ~ 5% of CF patients have this gene.



SCRIPT

Previously healthy patient with h/o behavioral disorders and/or substance abuse presents with:

- Acute coma with stable BP
- ↓ RR
- ↓ pO_2 , ↑ pCO_2
- Miosis
- A-a gradient = Normal

The cause of the hypoxemia is _____.

In conjunction with hypoxemia, miosis is a physical exam finding that suggests overdose of _____.

The cause of the hypoxemia is **hypoventilation**. In conjunction with hypoxemia, miosis is a physical exam finding that suggests overdose of **opiates**.

In conjunction with hypoxemia, miosis is a physical exam finding that suggests overdose of **opiates**. Only two situations are associated with hypoxemia and a *normal* A-a gradient: Breathing air that has a reduced concentration of oxygen (such as at high altitudes) and hypoventilating. This is why the A-a gradient assessment is so important. The normal A-a gradient tells you that no disease is present in the alveoli to disrupt diffusion of gases between the capillaries and the airways.



SCRIPT

Healthy patient with no PMH presents with:

- Coughing and wheezing that begins approximately 1/2 hour after exercise and with exposure to cold air. Symptoms self-resolve within an hour.
- Spirometry: Normal FEV₁, FVC, and flow-volume loop
- Normal DLCO

What is the diagnosis?

Diagnosis is **exercise-induced bronchospasm**.

One clue for the diagnosis is in the clinical history: Symptoms begin after exercise, not during.

Symptomatic asthmatics, and patients with vocal cord dysfunction, often have difficulty during exercise.

The normal spirometry and normal DLCO help to dissuade a diagnosis of asthma. However, if asthma is truly suspected based on additional clinical history, a methacholine bronchoprovocation test is indicated, because normal spirometry does not exclude asthma. The normal flow-volume loop helps you to exclude upper airway obstruction, such as vocal cord dysfunction.

Dx: Clinical + spirometry.

Tx: For intermittent exercise with symptoms: Inhaled SABAs 10 minutes before exercise; daily exercise with symptoms: LTRAs or ICS.



SCRIPT

Middle-aged smoker with a daily productive cough has the following pulmonary function test results:

- $FEV_1/FVC < 0.70$
- Flow-volume loop: Scooping of the curve in exhalation
- $\uparrow$ RV
- $\downarrow$ DLCO

What is the diagnosis?

Diagnosis is **COPD/emphysema**.

The reduced $FEV_1/FVC < 70\%$ is, by definition, obstruction. Next, you could classify the severity of obstruction based on the FEV_1 . The low DLCO tells you that the obstruction is in the lower airways and is not from a reversible condition, such as asthma. An exacerbated asthmatic may have a reduced $FEV_1/FVC < 70\%$, but the DLCO is normal. The scooping of the flow-volume loop during exhalation of low lung volume is classic for COPD. With time, the patient with COPD begins to trap air, which is reflected as an increase in the residual volume. With severe air trapping and RV increase, the TLC can also increase (termed "hyperinflated lung").

Dx: Pulmonary function tests, including DLCO.

Tx: Bronchodilators (SABAs, LABAs, short- and/or long-acting anticholinergics, theophylline) $\pm$ ICS $\pm$ PDE-4 inhibitor (roflumilast) $\pm$ O_2 per criteria + vaccinations (influenza, pneumococcus). ICS should be used in patients with GOLD grade 3 and 4 disease ($FEV_1 < 49\%$). Roflumilast is approved for grade 3 and 4 disease in patients with persistent exacerbations while on ICS. Do not use ICS as monotherapy for chronic COPD!



SCRIPT

Smoker < 45 years of age with exertional dyspnea and a productive cough has the following:

- $FEV_1/FVC < 0.70$
- Flow-volume loop: Scooping of the curve in exhalation
- $\uparrow$ RV
- $\downarrow$ DLCO
- Chest radiograph: Bullous emphysema at the bases

What is the diagnosis?

Diagnosis is **COPD due to α_1 -antitrypsin deficiency**.

The PFTs show obstruction with impaired gas exchange and decreased flow rates at low lung volumes (resulting in the scooping on the curve). This is classic emphysematous COPD. The young age and bullae at the bases should clue you into an underlying diagnosis of α_1 -antitrypsin deficiency.

Dx: Clinical + low serum level of α_1 -antitrypsin + abnormal genotype.

Tx: Cessation of smoking + IV α_1 -antitrypsin to raise the serum level (average cost ~ \$80,000/year!) + treatment of COPD (bronchodilators, ICS, oxygen, and support of nutrition and general health).

SCRIPT

Middle-aged patient who owns a parakeet presents with:

- Recurrent fever, cough, and dyspnea
- Chest radiograph: Interstitial infiltrates
- CBC: Normal
- Sputum: No eosinophils

What is the diagnosis?

Diagnosis is **hypersensitivity pneumonitis**.

The case could include any of the other exposures that can result in hypersensitivity. Common ones are moldy hay or wood, chemicals, and organisms that contaminate water systems that humidify air. The major clue is a history of recurrent pneumonias, without eosinophils, related to exposure to the antigen. You might have guessed psittacosis since the script contains the history of bird exposure. Be careful about loosely associating "bird" with psittacosis, since bird exposures can cause other conditions as well, such as this one. The clue here is the recurrent pneumonias after exposure to the antigen. Psittacosis will not have a recurrent history. With repeated antigen exposure, the patient can develop interstitial fibrosis.

Dx: Clinical.

Tx: Antigen avoidance + systemic oral glucocorticoids (if hypoxemic).



SCRIPT

Foundry worker with h/o cough and “eggshell calcifications” on CXR presents with 3 months of:

- Weight loss
- Night sweats
- Productive cough
- Occasional hemoptysis
- Sputum: + Acid-fast organisms

Diagnosis is _____ associated
with _____.

Diagnosis is **tuberculosis** associated with **silicosis**.

"Eggshell calcifications" is a buzz phrase that should suggest silicosis to you. You should definitely know that patients with silicosis are at increased risk for developing mycobacterial disease and should be screened yearly for exposure to tuberculosis. The important occupational history is exposure to silica dust in the following situations: Hard rock mining, construction, road work, tunneling, sandblasting, foundry work, granite or other stone work, ceramics, and glass manufacturing.

Dx: Clinical and of exclusion + abnormal chest radiograph ± HRCT of the chest.

Tx: Avoidance + yearly TB screening (induration of ≥ 10 mm using the PPD test is significance in patients with silica exposures) + lung transplant in young patients with severe disease.



SCRIPT

Middle-aged male with no PMH presents with:

- Progressive exertional dyspnea and dry cough
- Diffuse fine crackles
- Clubbing
- Chest CT: Reticular opacities and "honeycombing"
- PFTs: $FEV_1/FVC > 70\%$, $\downarrow FEV_1$, $\downarrow RV$, $\downarrow TLC$, $\downarrow DLCO$

What is the diagnosis?

Diagnosis is **idiopathic pulmonary fibrosis**.

This illness script is classic for IPF: The population affected is typically males in their 40s; progression is relentless; and the PFTs show restrictive lung mechanics. The history gives no helpful clues as to etiology (lack of exposures to drugs, infectious agents; no family history of lung disease; no personal or family history of connective tissue disease). You may have answered with the more general term "interstitial lung disease," which would be correct, but less precise. IPF is diagnosed by the CT findings. Clubbing is quite common in IPF but much less so in other forms of ILD. You can differentiate IPF from cryptogenic organizing pneumonia by the lack of fever and flares of pneumonia in patients with IPF.

Dx: Clinical and of exclusion + HRCT of the lung $\pm$ lung biopsy in difficult cases.

Tx: O_2 + vaccination + pulmonary rehabilitation + immunomodulation and antioxidants (in early phase of disease) using combinations of n-acetylcysteine, prednisone, and azathioprine + lung transplant. The antifibrotic, pirfenidone, is a newer agent.



SCRIPT

Young healthy patient presents for a routine pre-employment physical:

- Intermittent cough for years
- Chest radiograph: Significant hilar adenopathy with normal lungs
- TB skin test: Nonreactive
- HIV test: Negative
- PFTs: Normal

What is the most likely diagnosis?

Most likely diagnosis is **stage I sarcoidosis**.

Stage 1 sarcoid has only hilar lymphadenopathy as a feature. Lymphoma would be the other consideration as a cause of isolated hilar lymphadenopathy. However, patients with lymphoma would not be as healthy as the patient described in this clinical scenario. An exhaustive search for a noninvasive site for biopsy should be conducted, looking for skin lesions and lymphadenopathy to support the diagnosis. Measurement of an increased serum ACE level also is supportive.

Dx: Clinical and of exclusion + radiograph + tissue pathology showing noncaseating granulomas + serum ACE level.

Tx: Glucocorticoids for severe or systemic manifestations.

SCRIPT

Young male smoker presents with:

- Brownish-purplish papules and erythematous papular rash in the groin
- Bone pain with lytic lesions on radiograph
- Polyuria
- Lymphadenopathy
- Spontaneous pneumothorax

What is the diagnosis?

Diagnosis is **eosinophilic granuloma**.

Eosinophilic granuloma is another name for Langerhans cell histiocytosis and was previously termed "histiocytosis X." Anytime you see a young male presenting with a spontaneous pneumothorax, think of this diagnosis. Then check to see if any of the other features of eosinophilic granuloma are present: Cystic bone lesions causing pain; granulomas in the hypothalamus causing diabetes insipidus. The smoking element of the history is the biggest clue to the diagnosis; it is a very important association.

Dx: Clinical + biopsy of bone or skin lesion (Langerhans cells with CD1a, S100, and CD207 markers and Birbeck granules).

Tx: Depends on the extent of disease and includes immunomodulators and chemotherapeutic drugs + smoking cessation.



SCRIPT

40-year-old, premenopausal Caucasian female with a history of dyspnea presents with:

- Spontaneous pneumothorax
- $\pm$ Chylous pleural effusion
- CXR: Diffuse “honeycombing”
- HRCT chest: Diffuse and homogenous thin-walled cysts

What is the diagnosis?

Diagnosis is **lymphangioleiomyomatosis**.

Just as you should consider eosinophilic granuloma in young male smokers who present with spontaneous pneumothorax, you should consider this diagnosis in young female smokers who present with spontaneous pneumothorax (or chylous pleural effusion). The demographics in this case give you the most likely diagnosis, because the patient lacks any other features of similar diseases (lymphadenopathy associated with sarcoid; recurrent pneumonia upon exposure to antigens with hypersensitivity pneumonitis; history of asthma).

Dx: Clinical + HRCT ± lung tissue biopsy.

Tx: No good treatment is available; lung transplant.

SCRIPT

Asthmatic on montelukast and omalizumab, who is weaning from high-dose prednisone, develops:

- Allergic rhinitis
- Tender upper extremity nodules or other forms of skin rash
- Chronic cough and dyspnea
- CBC: ↑ Eosinophils
- U/A: Protein and RBC casts

What is the diagnosis?

Diagnosis is **Churg-Strauss vasculitis**.

Recognize that CS is a pulmonary-renal vasculitis that often occurs in the asthmatic who is being weaned off corticosteroids and initiating treatment with a leukotriene inhibitor and omalizumab. The very high peripheral eosinophilia is a reliable clue to the diagnosis.

Dx: Clinical $\pm$ tissue biopsy showing eosinophils.

Tx: Systemic glucocorticoids + cyclophosphamide (change to azathioprine for chronic maintenance) + treatment of asthma.



SCRIPT

Young male with no PMH presents with new-onset HTN and:

- Fever, malaise, weight loss
- Intermittent vague abdominal pain
- Testicular pain and swelling
- CBC: Leukocytosis ($\uparrow$ neutrophils)
- $\downarrow$ Hgb, normal MCV, $\uparrow$ ferritin, Fe/TIBC $> 20\%$
- $\uparrow$ ESR, $\uparrow$ serum creatinine
- U/A: No red cells or protein
- + HBsAg

What is the diagnosis?

Diagnosis is **polyarteritis nodosa**.

Polyarteritis nodosa is a systemic vasculitis that presents, on the Boards, with constitutional symptoms and mesenteric pain. Other symptoms may include testicular pain and evidence of renal arteritis but **without** glomerulonephritis (so azotemia may be present, but the urine sediment does not have protein, red cells, or red cell casts). Laboratory evidence of a systemic illness is common, with leukocytosis and anemia of inflammation present. PAN is the one diagnosis to consider when testicular pain and swelling are mentioned in conjunction with abdominal pain and positive serology for hepatitis B. Although only ~ 30% of cases of PAN are associated with active HBV, the association is common on exams. Distinguish this hepatitis association from HCV and cryoglobulinemia.

Dx: Biopsy of involved tissue shows vasculitis without eosinophils ± arteriogram showing aneurysms in small arteries.

Tx: Glucocorticoids. Add cyclophosphamide if moderate or severe. Add treatment for HBV, if necessary.



SCRIPT

Young male patient from a southern state, who frequently walks barefoot during the summers, presents with ~ 5 days of:

- Fever
- Dry cough and chest discomfort
- ↑ WBC (Differential: ↑ Eosinophils)
- Sputum: Charcot-Leyden crystals
- CXR: Migrating pulmonary infiltrates

What is the diagnosis?

Diagnosis is **Löffler syndrome (acute, benign eosinophilic pneumonia)** due to helminth infection. The case in an exam setting might not include the history of walking barefoot. Infection with a roundworm can cause this presentation (*Ascaris lumbricoides*, *Strongyloides stercoralis*, *Necator americanus*, and *Ancylostoma duodenale*). Always consider this diagnosis when you see recurrent, **self-resolving**, eosinophilic pneumonia. This case is different from acute and chronic eosinophilic pneumonias because the patient is not very sick, and the illness is self-limited.

Dx: Clinical + CBC showing eosinophilia ± demonstration of helminth larvae in gastric aspirate or sputum (difficult to find).

Tx: Usually self-resolves + bronchodilators + antihelminthic treatment.



SCRIPT

Male patient, aged 20–40 years, presents with acute onset:

- Fever and cough
- Acute respiratory failure that requires intubation, with no obvious inciting cause
- CXR: Diffuse alveolar and interstitial infiltrates
- Bronchoalveolar lavage: > 25% eosinophils
- Lung biopsy: Infiltration with eosinophils

What is the diagnosis?

Diagnosis is **acute eosinophilic pneumonia**.

Think of the 3 eosinophilic pneumonias this way: Acute eosinophilic pneumonia = young male who rapidly deteriorates and has to go on the ventilator; chronic eosinophilic pneumonia = middle-aged female with history of asthma who has chronic recurrences; and acute, benign eosinophilic pneumonia = a self-limited illness that presents with fleeting infiltrates.

Dx: Clinical and of exclusion.

Tx: Systemic glucocorticoids + supportive care.



SCRIPT

Middle-aged, asthmatic female presents with:

- Weight loss and night sweats
- Intermittent cough and dyspnea x months
- CXR: Diffuse alveolar infiltrates
- Bronchoalveolar lavage: > 25% eosinophils

What is the diagnosis?

Diagnosis is **chronic eosinophilic pneumonia**.

Think of the 3 eosinophilic pneumonias this way: Acute eosinophilic pneumonia = young male who rapidly deteriorates and has to go on the ventilator; chronic eosinophilic pneumonia = middle-aged female with history of asthma who has chronic recurrences; and acute, benign eosinophilic pneumonia = a self-limited illness that presents with fleeting infiltrates. You might have guessed allergic bronchopulmonary aspergillosis or Churg-Strauss here if you have loosely associated eosinophils with asthma in your mind. Remember that ABPA has eosinophilia and is associated with a high eosinophil count. Churg-Strauss causes a widespread vasculitis with eosinophils invading many tissues. Often CS is associated with tapering of glucocorticoids.

Dx: Clinical + CBC showing eosinophilia + lung biopsy showing eosinophils.

Tx: Systemic glucocorticoids.



SCRIPT

Asthmatic presents with:

- Asthma exacerbations every 2 months while on an inhaled and LABA + medium-dose ICS
- $\pm$ CBC: Eosinophilia
- Sputum: Branching hyphae

What is the diagnosis?

Diagnosis is **allergic bronchopulmonary aspergillosis**.

Recognize that the presence of fungal elements in the sputum of a patient with uncontrolled asthma = ABPA. Sometimes the case will not tell you that the culture grows *Aspergillus*. The case may mention that the prick test is positive and that the patient has an increased IgE level.

Dx: Clinical (history of asthma) + positive prick test + evidence of fungus (fungal elements in the sputum or antibodies against *Aspergillus* in the serum).

Tx: Systemic glucocorticoids + itraconazole.



SCRIPT

Young patient with h/o fatigue and iron deficiency anemia presents with:

- Hemoptysis
- ↑ DLCO
- Normal serum creatinine
- Sputum Prussian blue stain: Hemosiderin-laden alveolar macrophages
- U/A: No protein, red cells, or RBC casts

What is the diagnosis?

Diagnosis is **idiopathic pulmonary hemosiderosis**.

More often we see pulmonary-renal vasculitides present in adults. IPA is one of the rare causes of pulmonary hemorrhage that can present in young adults. This is not consistent with GPA or anti-GBM disease (Goodpasture's) because there is no renal involvement.

Dx: Clinical and of exclusion + lung biopsy (excludes other causes, especially vasculitis and infection).

Tx: Systemic glucocorticoids ± immunomodulators (azathioprine + hydroxychloroquine).

SCRIPT

Female in her 40s presents with:

- Exertional syncope
- Exam: JVD, large v waves, a loud P_2 , holosystolic murmur at LLSB, and normal lungs
- PFTs: Normal except for $\downarrow$ DLCO
- VQ scan: Low probability

What is the diagnosis?

Diagnosis is **idiopathic pulmonary arterial hypertension**.

This script is very important to recognize because you're unlikely to get much more in the clinical history on the exam. Perhaps you might be given chest pain with exertion instead of syncope. Disease is more common in females. The physical exam is describing the murmur of tricuspid regurgitation that often occurs in pulmonary hypertension. Always consider a serious diagnosis, such as IPAH, on the exam for a young patient with syncope when heart findings are given as part of the clinical scenario. This is not a simple vagal event. The echo findings were left out of the script because it's important to recognize the diagnosis with minimal information.

Dx: Echocardiogram + right heart catheterization.

Tx: O₂ + diuretics + CCBs ± endothelin receptor antagonists (bosentan) ± PDE-5 inhibitors (sildenafil) ± prostacyclins (iloprost) ± lung transplant.

Misc: You might be given only the initial symptoms and physical exam. Know that the first test to do to work up this patient is an echocardiogram—even before you work up the lungs. If the echo shows a dilated RV, then pulmonary evaluation begins with extensive testing.



SCRIPT

Patient with months of bilateral hand and knee pain presents with:

- Dyspnea
- Pleural effusion
- Active synovitis of bilateral MCPs, PIPs, and elbows
- Soft tissue nodular lesions over the olecranon bursa
- Pleural fluid glucose: < 30 mg/dL
- TB skin test: Nonreactive

What is the cause of the pleural effusion?

The pleural effusion is caused by **rheumatoid arthritis**.

The markedly low pleural fluid glucose, in addition to the other physical findings, helps you recognize that the pleural effusion is due to RA.

Dx: Clinical and of exclusion.

Tx: Treat underlying RA.

Misc: Note that in addition to having a low glucose, RA pleural effusions are exudative.



SCRIPT

Young healthy patient presents with:

- Fever
- Dyspnea
- Cough, productive of rust-colored sputum
- ↑ WBC (Differential: ↑ Neutrophils with band forms)
- CXR: Lobar consolidation
- Sputum Gram stain: Gram-positive, lancet-shaped diplococci

What is the diagnosis?

Diagnosis is *S. pneumoniae* **community-acquired pneumonia**.

"Lancet-shaped diplococci" is the buzz phrase for you to associate with pneumococcus.

Dx: Clinical + microbiologic (Gram stain and/or culture); perfectly acceptable to treat pneumonia empirically.

Targeted Tx: Beta-lactam antibiotic (penicillin, if susceptible; high-dose penicillin or cephalosporin, if resistant).

SCRIPT

Male with HIV/AIDS with a CD4 count $> 300/\mu\text{L}$ presents with:

- Fever
- Dyspnea
- Productive cough
- $\uparrow$ WBC (Differential: $\uparrow$ Neutrophils with band forms)
- CXR: Lobar consolidation
- Sputum Gram stain: Gram-negative coccobacilli
- Blood cultures grow the same organism

What is the diagnosis?

Diagnosis is *H. influenzae* **community-acquired pneumonia**.

Be able to recognize the common agents of pneumonia by their microbiologic morphology.

"Gram-negative coccobacilli" is a common buzz phrase for *Haemophilus*. Additionally, *H. influenzae* could be described as "pleomorphic gram-negative rods," which means that their shape is variable (sometimes rod-like, sometimes coccus-like). Remember that patients with HIV/AIDS and an $\uparrow$ CD4 count have increased risk for community-acquired pneumonia.

Dx: Clinical + microbiologic (Gram stain and/or culture); perfectly acceptable to treat pneumonia empirically.

Targeted Tx: Beta-lactam antibiotic.

SCRIPT

College wrestler presents with:

- Fever
- Dyspnea
- Cough, productive of salmon-pink sputum
- ↑ WBC (Differential: ↑ Neutrophils with band forms)
- CXR: Patchy alveolar consolidation with pneumatoceles
- Sputum Gram stain: Gram-positive cocci in clusters

What is the diagnosis?

Diagnosis is *S. aureus* **community-acquired pneumonia**.

The wrestler history is important because these individuals can harbor invasive staph species in their anterior nares and then transmit the organisms via wrestling exercises. Usually, however, staph CAP is seen in the elderly or in patients who have preexisting viral influenza. Recently, CAP due to MRSA isolates has been seen with increasing frequency and often is due to the strain possessing the Panton-Valentine leukocidin, which increases the isolate's virulence. Staph pneumonia is associated with mild hemoptysis (hence, the description "salmon-pink") and the development of pneumatoceles.

Dx: Clinical + microbiologic (Gram stain and/or culture).

Targeted Tx: Beta-lactam for MSSA isolates and vancomycin for MRSA isolates; linezolid is acceptable for MRSA coverage. Remember that daptomycin does not treat staph pneumonia because it does not penetrate the lung.



SCRIPT

Elderly smoker with FEV_1/FVC 0.35 presents with:

- Fever
- Dyspnea
- Worsening cough
- CXR: Lobar consolidation, in addition to chronic changes
- Sputum Gram stain: Gram-negative cocci

What is the diagnosis?

Diagnosis is *Moraxella* **community-acquired pneumonia**.

The clues in this case include the association with COPD and the bacterial morphology. Remember, there are only a couple of clinically significant gram-negative cocci: *Neisseria* species and *Moraxella*.

Dx: Clinical + microbiologic (Gram stain and/or culture); perfectly acceptable to treat pneumonia empirically.

Targeted Tx: Beta-lactam (amoxicillin-clavulanate or extended spectrum or cephalosporin), trimethoprim/sulfamethoxazole, macrolide (azithromycin or clarithromycin), tetracycline, or respiratory quinolone (levofloxacin).

SCRIPT

Young female presents with:

- Fever
- Dyspnea
- Productive cough
- Pulmonary consolidation
- Erythema nodosum
- ↓ Hgb and Hct with ↑ l. bili and ↑ reticulocytes
- Positive Coombs test
- + Cold agglutinins

What is the diagnosis?

Diagnosis is *Mycoplasma* **community-acquired pneumonia**.

Mycoplasma cases usually will include several *Mycoplasma* associations, as in this case. Common associations include an autoimmune hemolytic anemia, erythema nodosum, and erythema multiforme. Cold agglutinins are nonspecific, but they are often $> 1:64$ in *Mycoplasma* infections.

Dx: Clinical + cold agglutinins $> 1:64$ + IgM and IgG titers in acute and convalescent sera; empiric treatment is perfectly acceptable and standard.

Targeted Tx: Azithromycin, doxycycline, or respiratory quinolone (levofloxacin).



SCRIPT

Patient presents with:

- Sore throat for 7 days with gradual onset of low-grade fever, cough, and hoarseness
- Normal WBC
- CXR: Patchy infiltrate

What is the diagnosis?

Diagnosis is *Chlamydophila pneumoniae* (TWAR) community-acquired pneumonia.

The history in this case gives you what you need to know: Sore throat, hoarseness, and pneumonia, as a collective group of symptoms, are associated with *Chlamydophila pneumoniae* infection.

Dx: Clinical; organism is very difficult to culture and other diagnostics are not that good. EIA and PCR tests are available for use on respiratory specimens. IgM and IgG titers in acute and convalescent sera can be used. Empiric treatment is perfectly acceptable and standard.

Targeted Tx: Doxycycline x 10 days.



SCRIPT

Healthy patient presents with h/o fever, dyspnea, and a productive cough is given empiric amoxicillin-clavulanic acid for audible pulmonary consolidation. He returns with:

- Severe dyspnea
- Persistent fever
- New diarrhea
- Confusion
- $pO_2 < 60$ mmHg
- Serum Na < 140 mEq/dL

What is the diagnosis?

Diagnosis is *Legionella* **community-acquired pneumonia**.

Don't assume the diarrhea is due to the amoxicillin-clavulanic acid. Look at the aggregate clues: Unresponsiveness to beta-lactams, confusion, hyponatremia, diarrhea, and pneumonia. In aggregate, these signs and symptoms = *Legionella*.

Dx: *Legionella* urinary antigen (diagnoses *L. pneumophila* type 1 infection = 90% of cases) + *Legionella* culture of respiratory specimens on buffered charcoal yeast extract agar (for subsequent epidemiologic investigation, if index case).

Targeted Tx: Azithromycin or respiratory quinolone (levofloxacin).



SCRIPT

Young patient returns from a visit to Arizona with weeks of fatigue and:

- Cough
- Arthralgias
- Painful nodules along the shins
- Erythematous, target-shaped rash on the hands and extremities

What is the diagnosis?

Diagnosis is **primary infection with *Coccidioides immitis***.

Anytime you see "Arizona" in a question, think *Coccidioides*. The disease is nicknamed "Valley Fever" and "Desert Rheumatism." The painful nodules on the shins are erythema nodosum, and the target lesions are erythema multiforme. The question could use other southwestern states, such as California and New Mexico. Additionally, Filipinos and African-Americans have an increased risk of invasive disease; you might see the inclusion of one of these races as part of the clinical history for *Coccidioides*.

Dx: Clinical history + KOH smear and fungal culture of sputum (if available) + IgM and IgG anticoccidioidal antibodies in serum.

Tx: Most infections are self-limited, but severe disease and patients who have underlying immunodeficiencies or who are pregnant should be treated 3–6 months with fluconazole 400 mg/day or itraconazole 200 mg bid; amphotericin B is used for severe cases.

SCRIPT

10 days after returning home from a spelunking adventure, a healthy patient with a well appearance develops:

- Cough
- Fever
- CXR: Patchy infiltrates and hilar adenopathy

What is the diagnosis?

Diagnosis is **primary infection with *Histoplasma capsulatum***.

Spelunking (cave exploring) is a buzzword for infection with *Histoplasma*. The bats that live in the caves often transmit infection in their feces. Other clinical clues to histo that might be included in the history: Exposure to pigeon droppings and travel to the Mississippi and Ohio River valleys. The clinical exam could include painless mouth ulcers. Presentation of disease is localized to the lung unless the patient has underlying immunodeficiency, in which case the fungus can disseminate; e.g., blood stream infection, marrow infiltration.

Dx: Special stains can demonstrate organisms in sputa and in scrapings from mouth ulcers. Cultures are useful on respiratory specimens and mouth scrapings also. Complement fixation or immunodiffusion can be used to detect serum antibodies in immunocompetent patients. Serum and urine antigen tests are useful in patients with immunodeficiency who have disseminated disease.

Tx: Depends on extent of disease (mild = no treatment or itraconazole; moderate = itraconazole; severe = amphotericin B lipid preparation).



SCRIPT

Nonsmoking hunter from Alabama develops:

- An indolent productive cough
- CXR: Mass-like lesion
- Sputum KOH: Broad-based budding yeasts

What is the diagnosis?

Diagnosis is **blastomycosis**.

The yeast forms always give away this diagnosis: "B" is for "**blasto**" and for "**broad-based budding yeasts**." If the question does not include a description of the yeast forms, you could guess this diagnosis by noting a lung mass/cavity in a hunter from a southern state, such as Arkansas or Alabama. Other sites of involvement include the skin, bones, and GU system.

Dx: Identification of the yeast in clinical specimens + culture; serologic tests are not reliable.

Tx: Itraconazole or amphotericin B (for severe infections and any involving the CNS).



SCRIPT

Alcoholic presents with:

- Weight loss
- Night sweats
- Chronic cough productive of bloody, “fetid,” purulent material
- Pulmonary consolidation or cavity
- Halitosis
- Negative smears x 3 for acid-fast bacteria
- Negative testing for *M. tuberculosis* using nucleic acid amplification

What is the diagnosis?

Diagnosis is **anaerobic lung abscess**.

Note the chronicity of the symptoms, which is an important feature of this illness presentation and differentiates it from an acute gram-negative pneumonia. Anaerobic lung abscesses are associated with seriously bad breath and disgusting, smelly (termed "fetid") expectoration.

Dx: Clinical + chest CT; microbiologic data to confirm the infecting organisms is very difficult to properly collect because 1) anaerobes usually are involved and 2) many other organisms colonize the upper airway.

Empiric Tx: Parenteral clindamycin initially, then oral clindamycin x weeks to months.



SCRIPT

Elderly female with chronic cough and dyspnea presents with:

- Increased cough
- Night sweats
- Weight loss
- Unsuccessful sputum sampling because the patient swallows sputum
- CXR: Patchy infiltrates and apical bullous disease
- CT chest: Nodules and evidence of bronchiectasis
- BAL: +Acid-fast organisms
- TB skin test: Reactive to 8 mm

What is the diagnosis?

Diagnosis is **non-tuberculous mycobacterial infection of the lung**.

In real life, this lady has TB until proven otherwise. But in an exam setting, focus on the aggregate signs and symptoms: The TB skin test is reactive, but not significantly, for her risk group (atypical mycobacteria can cause induration on using PPD); the CT shows evidence of bronchiectasis; and the patient has apical bullous disease indicative of underlying COPD. These are the types of patients whose lungs become infected with atypical mycobacteria. When the infiltrates are limited to the right middle lobe, the precise term is Lady Windermere's disease.

Dx: Use the American Thoracic Society's guidelines (extensive and includes symptoms + underlying lung disease + multiple positive respiratory samples).

Tx: If the organism is MAC (which is the most common), treatment includes clarithromycin + rifampin + ethambutol. In real life, if you're going to manage a patient with this disease, consult the ATS guidelines because diagnosis and treatment are tricky.



SCRIPT

Healthy female patient 4-weeks s/p “tummy tuck” surgery presents with:

- Draining wound 10 days after a recent vacation in the Bahamas

What is the diagnosis?

Diagnosis is **cutaneous non-tuberculous mycobacterial infection**.

Recognize the association between an acute nonhealing wound and exposure to salt-water organisms.

Dx: Acid-fast smear and culture of wound exudate.

Tx: Culture-directed antituberculous regimen.



SCRIPT

Patient with HIV/AIDS with a CD4 count $< 200/\mu\text{L}$ presents with:

- Progressive exertional dyspnea
- Cough for 1 month
- Fever for 1 week
- CXR: Diffuse interstitial infiltrates
- ABG: $\text{pO}_2 < 70$
- $\downarrow$ DLCO and $\uparrow$ serum LDH

What is the diagnosis?

Diagnosis is *Pneumocystis jiroveci* **pneumonia**.

This clinical presentation is very important to recognize because most exam questions will give you only the clinical presentation without any diagnostic studies. The onset of PJP is usually chronic, but PJP should be considered in any patient with AIDS and pneumonia. Alternatively to infiltrates, the CXR could show a pneumothorax, nodules, or a pleural effusion, DLCO measurement is helpful in difficult cases because a normal DLCO practically excludes this infection.

Dx: Clinical + observation of organisms in respiratory specimens using methenamine silver, Giemsa, or immunofluorescent stains (induced sputum using hypertonic saline is least invasive). Empiric treatment of PJP is no longer recommended.

Tx: Depends on degree of hypoxemia; IV or trimethoprim/sulfamethoxazole but add prednisone wean for patients with $pO_2 < 70$. Trimethoprim + dapsone is alternative but is less effective and should only be used to treat patients with mild disease.

SCRIPT

Patient with AML, undergoing bone marrow transplant, develops:

- Cough and dyspnea without fever
- CBC: Absolute neutrophil count $< 500/\mu\text{L}$ for previous 14 days
- CXR: No acute changes
- HRCT of chest: Nodules with surrounding ground glass infiltrates ("halo sign") or an air-crescent sign or simple consolidation

What is the most likely diagnosis?

Most likely diagnosis is **invasive pulmonary aspergillosis**.

A “halo” is one of the earliest CT signs of invasive pulmonary aspergillosis, but it also can be seen with other invasive fungal infections and also with *Pseudomonas pneumonia*. IPA, however, is the first diagnosis for you to consider when you see any form of lung disease in the post-transplant patient who has been neutropenic for a prolonged period.

Dx: Clinical (high index of suspicion because of neutropenia) + direct observation of fungal hyphae in respiratory specimens + fungal culture or respiratory specimens + galactomannan antigen assay on serum or BAL fluid (remember, piperacillin-tazobactam cross-reacts with the assay, causing a positive result) + beta-D-glucan assay (used in early disease and can be positive in many fungal infections).

Targeted Tx: Voriconazole; lipid amphotericin B is an alternative.



SCRIPT

Patient with PMH of treated cavitory tuberculosis presents with:

- Mild, occasional hemoptysis and cough
- CXR: Obvious cavity with a mobile intracavitary lesion
- Sputum KOH: Fungal hyphae

What is the diagnosis?

Diagnosis is **Aspergilloma**.

Aspergillus is the cause of the fungus balls that grow inside old TB cavities. The clinical case could include upright and recumbent radiographs showing how the fungus ball moves within the cavity. Patients can have more severe disease with chronic cavitating infiltrates and weight loss (termed "chronic pulmonary aspergillosis" and can be cavitary or fibrosing).

Dx: Clinical + radiographic features + evidence of *Aspergillus* in the respiratory tract.

Tx: No treatment for most. Surgical resection if recurrent hemoptysis is an issue, or if the patient is developing symptoms of chronic infection, such as weight loss or fevers.

SCRIPT

Male presents with:

- Dyspnea
- Productive cough
- Occasional hemoptysis
- Nasal ulcer
- ↓ Hgb and Hct with normal MCV and MCHC
- U/A: Protein, RBCs, RBC casts
- CXR: Cavitory lesions and nodules
- + Anti-PR3 and c-ANCA

What is the diagnosis?

Diagnosis is **granulomatosis with polyangiitis**.

GPA previously was termed Wegener granulomatosis. GPA has a constellation of classic pulmonary and renal signs and symptoms: Nasal ulcers, lower airway disease (that can take several forms, including nodules, cavities, interstitial, and alveolar disease), and a pauci-immune glomerulonephritis. ANCA and anti-PR3 antibodies usually are positive in GPA. The case may also include a skin rash that could be several types, including papules, nodules, vesicles, and ulcers.

Dx: Clinical + biopsy of tissue showing vasculitis.

Tx: Cyclophosphamide or rituximab + glucocorticoids + trimethoprim/sulfamethoxazole prophylaxis during induction therapy to prevent *Pneumocystis*.

SCRIPT

Male patient with BMI > 30 presents complaining of:

- Daytime “fogginess”
- Dyspnea
- New lower extremity edema
- ↑ Serum HCO_3

What is the diagnosis?

Diagnosis is **obesity hypoventilation syndrome**.

The key to this clinical presentation is recognizing that a BMI > 30 indicates obesity, so obstructive sleep apnea is likely a factor. A chronic respiratory acidosis results in metabolic compensation, which increases the serum bicarbonate level. The new lower extremity edema indicates that the patient is developing cor pulmonale. Obstructive sleep apnea is a sneaky disease and can present even in patients who are not "obese" using the BMI measurement. Typically, disease presents in those in the "overweight" range. It is associated with development of hypertension, stroke, arrhythmias, and CHD. Patients with CHD and untreated OSA have higher risk of death due to their coronary disease. This script is somewhat blatant, as it includes the obesity, the cognitive impairment, the metabolic compensation, and the lower extremity edema. A Board exam clinical scenario describing OSA may be more elusive.

Dx: Polysomnogram.

Tx: Weight loss $\pm$ noninvasive positive airway pressure $\pm$ O₂ $\pm$ surgery.



SCRIPT

Nonsmoking patient presents with 4 months of:

- Weight loss
- Fever
- Progressive cough, productive of profuse watery sputum with a salty taste

What is the diagnosis?

Diagnosis is **bronchoalveolar adenocarcinoma**.

This form of lung cancer is associated with profuse sputum production, termed "bronchorrhea" (which by definition is > 100 cc of sputum/day). Occasionally, the bronchorrhea is associated with salt-wasting and can cause electrolyte imbalances.

Dx: Lung imaging + PET scan + tissue biopsy.

Tx: Variable, based on extent of disease.

SCRIPT

Nonsmoking female presents with:

- Intermittent cough with hemoptysis
- Long bone pain
- Clubbing
- Pain with palpation of the anterior tibias

What is the diagnosis?

Diagnosis is **adenocarcinoma of the lung with hypertrophic osteoarthropathy**.

HOA can be primary or secondary and presents as long bone pain. Adenocarcinoma of the lung is the most common inciting neoplasm. Clubbing is a distinct feature.

Dx: Clinical.

Tx: NSAIDs + treatment of underlying disorder.

Rheumatology

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SCRIPT

Patient with known RA and a chronic knee effusion presents with:

- Acute pain and swelling behind the knee
- Soft swollen area in the popliteal fossa
- Ipsilateral knee effusion
- No lower extremity edema
- Doppler U/S: No evidence of deep venous thrombosis

What is the diagnosis?

Diagnosis is **Baker cyst**.

Know that you can go ahead and treat this condition once you exclude DVT (you do not need MRI). Arthrocentesis of the knee and injection of the knee with corticosteroids is the treatment. The reason you pull fluid off the knee is because the knee effusion is the cause of the cyst—which is simply a posterior dislocation of the fluid.

Dx: Clinical + exclude DVT with ultrasound.

Tx: Analgesics + corticosteroid injection of the knee + treatment of the underlying disease causing the effusion (e.g., RA).

SCRIPT

Patient with known OA of the knee presents with:

- Worsened knee pain that wakes patient from sleep
- Point tenderness on the inferomedial aspect of the knee (~ 4–6 cm below the patella)
- Knee radiograph: Stable osteophytes

What is the diagnosis?

Diagnosis is **pes anserine bursitis**.

Look for the clinical history of preexisting OA—it's common in anserine bursitis. This is the diagnosis to consider in any patient with known knee OA who develops atraumatic medial knee pain. The tenderness is usually only over the quarter-sized bursa and does not extend up to the joint. If you see that pain does extend, consider disease of the medial collateral ligament.

Dx: Clinical; if the area is erythematous and/or the patient has fever (indicating infectious bursitis), the bursa should be tapped with fluid sent to Gram stain and culture.

Tx: Analgesics + splinting for mild cases ± steroid injection; antibiotics for an infectious bursitis.



SCRIPT

Patient with h/o recurrent bilateral uveitis presents with:

- Recurrent, **painful**, oral mucosal ulcers, never on the lips
- Recurrent, **painful**, genital mucosal ulcers, not associated with vesicles
- Recurrent skin rash

What is the diagnosis?

Diagnosis is **Behçet disease**.

The case could include the presentation of aseptic meningitis, encephalitis, or vascular thrombosis, although these events occur in < 20% of patients. The ulcerations are not herpetic because they do not occur on the lips and because they are not ever associated with vesicles. When you see oral and genital aphthous-type ulcerations that are painful, think Behçet's (lupus ulcers are typically painless). The type of skin rash is variable and can be papular, vesicular, pustular, nodular, ulcerative, or purpuric—even acneiform. Deep venous thrombosis and a nonerosive, asymmetric polyarthritis might be presented in the clinical scenario. In the U.S., Behçet's usually occurs in young adults from the Middle East or Asia.

Dx: Clinical and of exclusion.

Tx: Based on organ system involvement and includes immunomodulators.



SCRIPT

Patient with h/o Raynaud's presents with:

- Fatigue
- Arthralgias
- Myalgias
- Joint stiffness
- Heartburn
- Chronic cough after eating
- Skin tightness on the face, hands, upper arms, shoulders, and chest
- ↓ Hgb and Hct
- Normal MCV and MCHC
- +: ANA and anti-Scl-70

What is the diagnosis?

Diagnosis is **systemic sclerosis (previously “scleroderma”)**.

The case could include anti-centromere antibody (more strongly associated with limited sclerosis), as well, and could also focus more on the prognostic implications of the different autoantibodies (anti-Scl-70 [also called antitopoisomerase] = increased risk of interstitial lung disease; anti-centromere = increased risk of pulmonary hypertension). Raynaud's and reflux together in a scenario should cause you to definitely consider systemic sclerosis, as almost no other diagnoses are associated. Presentation can be diffuse SS or limited SS (previously termed “CREST” syndrome). Diffuse SS is associated with development of interstitial lung disease and pulmonary arterial hypertension; disease is more commonly seen in those who have the anti-Scl-70 antibody. Pulmonary HTN is seen in limited SS and is associated with the anti-centromere antibody.

Dx: Clinical and of exclusion.

Tx: Symptomatic + ACEI to prevent scleroderma renal crisis; no therapy alters disease progression otherwise.



SCRIPT

60-year-old male patient presents with years of:

- Progressive weakness of hands → proximal muscles (quadriceps)
- Bilateral, asymmetric atrophy of hand muscles and upper arms
- Reduced deep tendon reflexes
- Normal or mild ↑ serum AST, ALT, LDH, and CPK
- Negative ANA
- Normal ESR
- Muscle biopsy showing rimmed vacuoles and ragged red fibers

What is the diagnosis?

Diagnosis is **inclusion body myositis**.

You may have picked any of the following: Amyotrophic lateral sclerosis (ALS), Lambert-Eaton syndrome, myasthenia, steroid-induced myopathy, polymyositis, or hypothyroidism. This is not ALS because the clinical scenario does not contain any evidence of both upper and lower motor neuron lesions, such as fasciculations in addition to the atrophy. This is not Lambert-Eaton because the scenario says nothing about strength improving with exercise. This is not myasthenia because myasthenia causes proximal muscle fatigue and is associated with acetylcholine receptor antibodies. This is not hypothyroidism or steroid-induced myopathy because the case doesn't include any symptoms suggesting thyroid disease or any history of steroid use. Notice that the case emphasizes changes in the hands. Think about IBM in patients over 50 who have primarily distal weakness (often asymmetric) in finger flexors (weak handshake) and foot dorsiflexors (anterior tibialis weakness). Dysphagia and proximal muscle weakness, especially the quadriceps, often occurs.

Dx: Clinical + EMG + muscle biopsy (showing characteristic myocyte inclusions with rimmed vacuoles and ragged red fibers).

Tx: Prednisone + methotrexate or azathioprine generally is used, but most patients do not improve much.

SCRIPT

Female patient presents with:

- Fatigue
- Myalgias
- Mental fogginess
- Interrupted sleep
- Pain in multiple tender points
- Normal CBC, chemistry, and ESR

What is the diagnosis?

Diagnosis is **fibromyalgia**.

The buzz phrase in this case is "tender points." 2011 American College of Rheumatology guidelines, however, allow for diagnosis without doing an assessment of tender points, so you might see a case that presents only the classic history without mentioning tender points. The newer criteria require only objective demonstration of chronic pain and fatigue with cognitive impairment, as measured by the Widespread Pain Index and the Symptom Severity Scale. All other possible diagnoses must be excluded, as well. Be sure that you exclude sleep apnea, as that is a disease that presents very similarly.

Dx: 2011 ACR FM criteria + exclusion of other diagnostics (normal CBC, ESR or CRP, and metabolic and liver panels).

Tx: Education + exercise + qhs tricyclic antidepressants or cyclobenzaprine; pregabalin, milnacipran, and duloxetine also are approved.

Misc: Pregabalin, duloxetine, and milnacipran are associated with suicidal ideation.



SCRIPT

Elderly patient with h/o weight loss, fevers, and chronic back and shoulder pain presents with:

- Headache
- Scalp tenderness
- Jaw pain that is worse with eating
- Weight loss
- ↓ Hgb and Hct
- Normal MCV and MCHC
- ESR > 50
- Normal serum CPK

What is the diagnosis?

Diagnosis is **giant cell (temporal) arteritis (GCA)**.

You might have picked fibromyalgia because of the musculoskeletal complaints. Recognize that 1) fibromyalgia usually is not a disease of the elderly, and 2) fibromyalgia is not associated with worrisome symptoms such as fever and weight loss. The script is drawing on the association between polymyalgia rheumatica and GCA. GCA could present with amaurosis fugax or diplopia.

Dx: Clinical and of exclusion + ESR or CRP (increased) + biopsy of the temporal artery.

Tx: Immediate glucocorticoids (prednisone 40–60 mg/day) at suspicion of diagnosis and continued for 2–4 weeks, even if a biopsy cannot be obtained immediately. A gradual wean can then be accomplished over the next 9–12 months. Flares can occur if you wean too rapidly. If vision loss is present at evaluation, use high-dose pulse IV steroids x 3 days, then drop to prednisone 60 mg/day x 2–4 weeks, followed by a 9–12-month wean. Most patients will require prednisone for ≥ 2 years and relapses are especially common during the first year. Low-dose ASA is recommended to prevent ischemic complications. Monitor for abdominal aorta aneurysm (AAA) after 2–3 years of GCA diagnosis.



SCRIPT

Patient older than 50 years with h/o weight loss and low-grade fevers presents with:

- Chronic bilateral pain in the back, shoulders, and hips
- Normal strength testing
- ↓ Hgb and Hct
- Normal MCV and MCHC
- ESR > 40
- Normal serum CPK

What is the diagnosis?

Diagnosis is **polymyalgia rheumatica**.

You might have guessed a myositis, myasthenia gravis, or fibromyalgia for this script. This is not myositis because the CPK is not elevated. This is not myasthenia or myositis because the patient is presenting with **pain**, not weakness. Both myositis and myasthenia present with profound weakness, not pain. This is an important distinguishing point. Fibromyalgia would be incorrect because this patient has worrisome features of fevers, weight loss, anemia, and an elevated ESR, telling you something serious is wrong. Elderly patients on the Board exam aren't diagnosed with fibromyalgia—that's a diagnosis for younger people.

Dx: Age > 50 years + clinical Hx + ESR > 40.

Tx: Prednisone 10–20 mg/day usually results in profound improvement within 3 days. A gradual wean can then be accomplished over the next year. Do a good ROS to ensure that the patient has no symptoms of giant cell arteritis, because those patients need a biopsy and a higher dose of prednisone for treatment.

SCRIPT

Patient with known HCV presents with:

- Malaise and arthralgias
- Pins and needles sensations in both feet
- Scattered lymphadenopathy
- Hepatosplenomegaly
- Nonblanching palpable violaceous rash around the ankles
- $\pm$ $\uparrow$ Serum creatinine
- $\downarrow$ C3 and C4
- $\pm$ U/A: Proteinuria, red cells, RBC casts

What is the diagnosis?

Diagnosis is **cryoglobulinemia**.

What are "cryoglobulins"? Cryoglobulins are immunoglobulins that precipitate in a cold environment and they consist of 3 types. Types II and III are commonly caused by HCV infection. Because Types II and III have immune complexes consisting of IgM and IgG, they are called "mixed" cryoglobulinemias. The IgM in these 2 types is a rheumatoid factor (antibody against the Fc portion of IgG), which activates the complement cascade. Disease occurs when these antibody-antigen complexes deposit in arteries and arterioles. Purpura in a stable patient with HCV will usually be due to mixed cryoglobulinemia and disease can be systemic.

Dx: Clinical and of exclusion + C3 and C4 (low) + measurable cryoglobulins in serum (requires special collection method) ± skin and/or renal biopsies.

Tx: Treat the HCV infection + plasmapheresis and immunomodulation for severe disease.

Misc: Don't forget: PAN is associated with HBV; cryoglobulins and porphyria cutanea tarda are associated with HCV. Remember that true petechiae and purpura do not blanch with pressure.



SCRIPT

Diabetic patient, 40–60 years of age, presents with:

- Chronic shoulder pain that limits overhead reach
- Gradual shoulder stiffness and decreased range of motion
- Reduced active and passive range of motion of the glenohumeral joint
- Normal shoulder radiograph

What is the diagnosis?

Diagnosis is **adhesive capsulitis (frozen shoulder)**.

The clinical history could include previous use of a sling for a prolonged period in susceptible individuals. You might have guessed a rotator cuff tendinopathy or tear, but those patients have preserved passive range of motion. Symptoms typically resolve in 1–2 years.

Dx: Clinical + radiographs that exclude evidence of OA.

Tx: Analgesics + physical therapy + intraarticular injection.

SCRIPT

Patient presents with:

- Lateral shoulder pain that disrupts sleep and inhibits range of motion (ROM)
- Most intense pain ~ 4 inches down the outer arm
- Reduced active, but normal passive, shoulder ROM
- Subacromial injection of lidocaine relieves the pain and restores active ROM

What is the diagnosis?

Diagnosis is **subacromial bursitis**.

This is inflammation of the little bursa that sits between the acromion and the greater tubercle of the humerus. If the lidocaine does not relieve the pain and weakness, think about rotator cuff tear.

Dx: Clinical + radiographs that exclude evidence of OA.

Tx: Analgesics + physical therapy + subacromial bursal injection.



SCRIPT

Middle-aged patient presents with:

- Pain over the lateral deltoid, worse during sleep and with overhead reach
- Weakness with external rotation of flexed forearm against resistance
- Inability to smoothly adduct the shoulder
- Pain when abducted > 90 degrees

What is the diagnosis?

Diagnosis is **rotator cuff tear**.

The tests included in this scenario are sensitive and specific for rotator cuff tears (weak external rotation, drop arm sign, and the painful arc). Sometimes pain is not a cardinal feature—think about rotator cuff tear when the patient is unable to perform active ROM in most directions.

Dx: Clinical + radiographs that exclude evidence of OA + MRI (shows tear).

Tx: Analgesics + physical therapy + surgery in refractory cases.

SCRIPT

Patient with RA presents with:

- Swollen and tender elbow
- Erythema and heat overlying the olecranon process
- Normal elbow flexion and extension

What is the diagnosis?

Diagnosis is **olecranon bursitis**.

Remember that important bursae are in the elbow and in 3 specific areas of the knee. Look at the clinical history to determine whether disease is in the bursa overlying the joint or on the medial or lateral aspects of the olecranon.

Dx: Clinical (exam reveals tender and swollen or thickened bursa); if the area is erythematous and/or the patient has fever (indicating infectious bursitis), the bursa should be tapped with fluid sent for Gram stain and culture.

Tx: Analgesics + splinting for mild cases; antibiotics for an infectious bursitis.



SCRIPT

Athletic, middle-aged patient presents with:

- Lateral elbow pain, worse with gripping and throwing
- Pinpoint pain on the lateral epicondyle

What is the diagnosis?

Diagnosis is **lateral epicondylitis (tennis elbow)**.

This one is a dead giveaway because pain is on the lateral epicondyle; same for medial epicondylitis (pain is on the medial epicondyle [golfer's elbow]). Look at the clinical history to determine whether disease is in the bursa overlying the joint or on the medial or lateral aspects of the olecranon.

Dx: Clinical.

Tx: Analgesics + rest + splint.



SCRIPT

Pregnant patient presents with:

- Pain over the radial wrist and hand, worse when pinching or grabbing
- Intense pain when thumb is flexed inside the fist and hand is deviated toward the ulna (Finkelstein test)

What is the diagnosis?

Diagnosis is **de Quervain tenosynovitis**.

Pregnant patients are at increased risk of developing this tendonitis. Think about this when you see radial hand pain and no history of trauma. Presentation is more common in women age 30–50 years.

Dx: Clinical.

Tx: Analgesics + ice packs to the base of the thumb + taping of thumb to pointer finger to reduce motion + passive stretching of thumb after stabilization. Steroid injections can be beneficial. Surgery is curative and reserved for refractory cases.

SCRIPT

Alcoholic Caucasian male patient older than 50 years develops:

- Progressive contractures of the hand
- Palpable nodules across the palmar fascia

What is the diagnosis?

Diagnosis is **Dupuytren contracture**.

The history could include an occupational exposure to repeated vibrations of the hand or a medical history of diabetes.

Dx: Clinical.

Tx: Passive stretching of the palms twice daily + glucocorticoid injection for pain; surgical relief for severe cases. Collagenases also can be injected into the "cord" to hydrolyze the collagen, which helps reduce the degree of contraction and improve range of motion.



SCRIPT

Patient presents with:

- Complaint of “hip pain” on the outer thigh, especially when lying flat
- Point tenderness over the lateral hip over the greater trochanter
- Normal gait
- Normal range of motion
- Normal plain radiographs

What is the diagnosis?

Diagnosis is **trochanteric bursitis**.

Recognize the difference between hip bursa pain and true hip joint pain. Pain in the bursa is felt in the lateral hip. True hip joint pain is felt in the groin, and ROM is limited or painful. These are very important distinguishing pieces of the clinical history. Radiographs help to exclude referred pain from the SI joint and lytic diseases of the femur or pelvic bones.

Dx: Clinical.

Tx: Analgesics + injection of the bursa with corticosteroid.



SCRIPT

Patient presents with:

- Dull aching and paresthesias in the first 3 fingers, of either 1 or both hands, that awaken from sleep
- Subjective weakness in the hand(s)
- Flicking the wrist improves symptoms

What is the diagnosis?

Diagnosis is **carpal tunnel syndrome**.

Nocturnal pain and paresthesias in the distribution of the median nerve is the biggest clue. The scenario could include atrophy of the thenar eminence on an exam. Common causes include pregnancy, thyroid disorder, use of repetitive vibrating tools, and RA.

Dx: Clinical + electrodiagnostic testing (shows median neuropathy).

Tx: Wrist splint + analgesics + glucocorticoid injections or surgery for refractory cases.



SCRIPT

Patient who lays carpet for a living presents with:

- Painful, swollen knee
- Erythema and localized tenderness over the patella
- No crepitus or knee effusion
- Normal range of motion

What is the diagnosis?

Diagnosis is **prepatellar bursitis**.

There are a few bursae to keep track of because they can all get infected/inflamed: Olecranon bursa, anserine bursa, and the patellar bursae (there are 3: Supra-, infra-, and prepatellar). Prepatellar bursitis is easy to recognize because of a key clinical history of excessive kneeling (thus, sometimes called "housemaid's knee") and erythema over the patella that does not involve the joint itself.

Dx: Clinical; if the area is erythematous and/or the patient has fever (indicating infectious bursitis), the bursa should be tapped with fluid sent for Gram stain and culture.

Tx: Analgesics + splinting for mild cases $\pm$ steroid injection; antibiotics for an infectious bursitis.



SCRIPT

Patient presents with:

- Severe heel pain with the first couple steps in the morning
- Pain with each step
- Point tenderness on the bottom of the foot when the foot is dorsiflexed

What is the diagnosis?

Diagnosis is **plantar fasciitis**.

Be sure to note the specific physical exam findings when answering a question about foot pain. Be sure the question is discussing pain in the plantar fascia and not pain in the Achilles tendon, which is also commonly asked about in the context of spondyloarthropathies.

Dx: Clinical; exclude calcaneal stress fracture and Paget disease with radiograph.

Tx: Analgesics + heel support + rest + calf stretches + corticosteroid injection in refractory cases.

SCRIPT

Middle-aged patient presents with:

- Lower back pain, exacerbated by walking and standing and relieved by sitting, bending forward, stooping over a shopping cart, and walking up inclines
- Normal distal pulses
- Normal radiographs of the back and hips

What is the diagnosis?

Diagnosis is **spinal stenosis**.

Spinal stenosis should be suspected when the patient has pain that is relieved when the vertebral spaces are opened, such as when the patient stoops or bends forward. Differentiate this entity from vascular claudication by the history and physical (vascular doesn't improve with bending, and the exam shows no evidence of vascular insufficiency).

Dx: Clinical + MRI in patients who are unresponsive to a month of conservative treatment.

Tx: Analgesics + physical therapy x 1 month as conservative therapy for suspected cases (unless neurologic deficits are present). Surgery can be used for pain refractory to conservative management.

SCRIPT

Alcoholic patient presents with:

- Unilateral groin ache, worse with weight-bearing and at night
- Pain with internal rotation and abduction of that hip
- Normal plain films of the hips

What is the diagnosis?

Diagnosis is **avascular necrosis (osteonecrosis) of the hip**.

The 2 most common causes of avascular necrosis are chronic alcoholism and steroid use. Other causes include HIV/AIDS, sickle cell anemia, systemic lupus, or kidney transplant. Remember that the contralateral side is frequently involved also, even if the patient has no symptoms, and plain radiographs are commonly normal early in the course of disease. The clue to this case is that the patient is a chronic alcoholic and has groin pain without evidence of osteoarthritis on radiographs.

Dx: Clinical + radiographs (abnormal in late stage) + MRI.

Tx: Analgesics + rest + surgical procedures aimed at improving blood flow or stabilizing the bone.



SCRIPT

Obese patient presents with:

- Pain and mild stiffness in both groin areas, worse with weight bearing and better with rest
- Lack of inflammation and no effusion, crepitus, or bony swelling
- Standing radiographs of the hips: Joint space narrowing and osteophytes without erosions

What is the diagnosis?

Diagnosis is **hip osteoarthritis**.

The clues to OA: Joint space narrowing and excessive bone formation (osteophytes). Say this over and over to yourself: Joint space narrowing with new bone formation. On the exam, this is a nonerosive and asymmetric disease process.

Dx: Clinical + radiographs showing joint space narrowing and new bone formation + noninflammatory joint fluid (if present).

Tx: Weight loss, physical therapy, analgesics (acetaminophen, NSAIDs) + tramadol, intraarticular steroids, intraarticular hyaluronic acid for continued pain + surgical hip replacement for refractory pain.

SCRIPT

Patient presents with a nontraumatic lump on the wrist that appears as:

- Single palpable swelling at the base of the hand that transilluminates with light

What is the diagnosis?

Diagnosis is **ganglion cyst**.

Solid tumors do not transilluminate.

Dx: Clinical $\pm$ ultrasound or MRI.

Tx: Aspiration and glucocorticoid injection + surgical excision of the cyst.

SCRIPT

20–40-year-old patient presents with:

- Fatigue, intermittent fever, and weight loss
- Arthralgias and stiffness in hands and knees x hours each morning
- Bilateral synovitis in the wrists and MCPs with ↓ range of motion of wrists and fingers
- Hand radiographs: Erosions and joint space narrowing
- ↓ Hgb and Hct with normal MCV and MCHC
- ↑ ESR and +anti-citrullinated peptide antibody (anti-CCP)

What is the diagnosis?

Diagnosis is **rheumatoid arthritis**.

Anti-citrullinated peptide/protein antibodies (ACPA), of which anti-CCP is a type, are very specific for diagnosing RA (> 90–95%), and their presence is predictive of future erosive disease. The pattern of arthritis (symmetric, erosive, involving wrists and MCPs) is defining. You might have thought this was lupus arthritis, which is also symmetric, but lupus arthritis is nonerosive. Other arthritides that affect wrists and MCPs, such as hemochromatosis, usually are not symmetric.

Dx: Remember the following for the exam—the patient should have all 4: Inflammatory arthritis of **≥ 1 joint**, RF and/or anti-CCP antibodies, increased ESR and/or CRP, and duration > 6 weeks. All other diseases also must be excluded as a cause for the findings.

Tx: Early DMARD (methotrexate [watch CBC and LFTs; CI in liver disease and alcoholics] or leflunomide is 1st choice; sulfasalazine and hydroxychloroquine [requires baseline eye exam and an annual eye exam after 5 years of continuous therapy] for mild disease; biologic DMARD can be added to methotrexate for refractory cases).

Misc: Biologic DMARD treatment excludes live virus vaccines and requires yearly TB screening; watch out for infectious complications, such as URIs and severe bacterial and fungal infections.

SCRIPT

Diabetic patient age 40–50 years presents with:

- Recurrent swollen and painful wrist with no history of trauma
- Mildly ↑ AST and ALT
- Radiograph: Evidence of chondrocalcinosis and hooked osteophytes at MCP2,3

What is the underlying diagnosis?

Underlying diagnosis is **hemochromatosis**.

You might have guessed CPPD as the cause of the swollen wrist. CPPD is correct (chondrocalcinosis helps you with the diagnosis), but there is more to this question—the hooked osteophytes are pathognomonic for hemochromatosis. Also, remember the association of CPPD with underlying hemochromatosis in patients younger than age 55 years. The diabetes and increased transaminases point you to underlying hemochromatosis. An exam question might give you iron studies showing an increased ferritin and transferrin saturation (Fe/TIBC). Remember that CPPD in a younger male or postmenopausal female patient should make you consider underlying hemochromatosis, hyperparathyroidism, and hypothyroidism. (Recognize that symptoms of hemochromatosis often are delayed in females until they become postmenopausal, because monthly menstruation acts as a form of phlebotomy.)

Dx: Ferritin (increased), Fe/TIBC $\geq 45\%$, screening for *HFE* gene mutations in 1st degree relatives of index cases, and liver biopsy in patients with abnormal LFTs or ferritin $> 1,000$.

Tx: Phlebotomy 1–2x/week beginning at diagnosis and aim for normal iron stores; avoid alcohol, vitamin C (promotes iron absorption), iron supplements, and uncooked seafood (risk of *Vibrio vulnificus* infections).

SCRIPT

Tall male adolescent presents with:

- 3/6 high-pitched decrescendo diastolic murmur, loudest at the left sternal border, accentuated when leaning forward
- Arachnodactyly
- Scoliosis
- “Thumb sign” and “Wrist sign”
- Arm span > height

What is the diagnosis? What is the leading cause of death in patients with this diagnosis?

Diagnosis is **Marfan syndrome**. Leading cause of death is **aortic dissection**.

Recognize that the heart murmur described is aortic regurgitation. Sometimes an additional Austin-Flint diastolic murmur is audible at the apex. Wrist sign means the thumb overlaps the 5th finger when making a circle around the wrist with the hand. The thumb sign means that the distal thumb pokes out from the inside of a closed fist (in patients without Marfan's, the thumb is buried inside the closed fist).

Dx: Clinical (Ghent nosology criteria) and include the cardinal features of increased diameter of the aortic root and ectopia lentis + mutation in the *FBN1* gene.

Tx: Patients with known Marfan's should have yearly evaluation of their aortic root with echocardiogram and should be prescribed a beta-blocker to slow the progression of aortic root dilation. Avoid high intensity exercise because it can cause a great spike in blood pressure.

SCRIPT

Patient with known RA presents with:

- Occipital headache
- Mild loss of sensation to fine touch in both hands
- Bilateral ↓ grip strength

What is the diagnosis?

Diagnosis is **C1–2 subluxation**.

Of course, headache has several etiologies, but when headache is specifically occipital and is associated with neurologic symptoms in a patient with RA, think about disease in the neck, specifically C1–2 subluxation. Typical causes of headache, such as migraine, are unrelated to the history of RA and would not explain the neurologic symptoms. Patients at high risk for this complication are older with more active and erosive disease with a high inflammatory marker and evidence of subluxations in peripheral joints.

Dx: Cervical spine radiographs followed by MRI of the C-spine, if radiographs suggest subluxation. MRI shows well how the bones in the neck relate to the cord, but the test can underestimate the degree of subluxation, which is best shown on plain films.

Tx: In patients with mild subluxation, cervical collars give stability to the spine. Surgical intervention to improve stability is recommended for patients who have symptoms or evidence of cord compression.



SCRIPT

Female with known RA and osteoporosis from long-term corticosteroid use presents with:

- Acute low back pain that radiates around the pelvic girdle
- Stable ulnar deviation and rheumatoid nodules
- No active synovitis
- No pain with straight leg raises

What is the diagnosis?

Diagnosis is **vertebral compression fracture**.

Sure, this lady could have other reasons for back pain, such as myeloma or metastatic cancer, but in this clinical question, where the scenario tells you that the patient has osteoporosis, the diagnosis is most likely a vertebral compression fracture. Remember to think about the most likely diagnosis given the clinical context, instead of synthesizing a differential diagnosis of 20+ rare diseases. Know that RA never, ever, ever affects the lumbar spine, so this is not an RA flare.

Dx: According to the guidelines on management of back pain by the ACP, imaging studies of the spine can be done if you suspect this fracture in a person with a "serious underlying diagnosis" or symptoms of neurologic impairment (MRI would probably be the best test, although starting with plain films is reasonable). RA with a history of chronic steroid use would be a serious underlying diagnosis. However, patients without those features should be managed with conservative therapy for one month before you perform any radiographs.

Tx: Analgesics and physical therapy. Treat underlying osteoporosis (e.g., bisphosphonates, teriparatide, denosumab, raloxifene).



SCRIPT

Patient with staph furuncles presents with:

- Fever
- Hot, swollen, tender knee with large effusion and reduced range of motion
- Arthrocentesis: WBC > 100,000 cells/mm³ with no crystals
- Gram stain: Gram-positive cocci in clusters

What is the diagnosis?

Diagnosis is **septic arthritis**.

Gout could present similarly with very inflamed synovial fluid, but the lack of crystals excludes it. If the case presents an unusual joint, such as the sternoclavicular joint, consider injection drug use as the causative factor. Injection drug users have increased risk of resistant and unusual organisms, such as MRSA and *Candida*. Lyme disease and tuberculosis can infect the knee but generally do not have such an angry presentation.

Dx: Arthrocentesis with Gram stain and culture.

Tx: Culture-directed parenteral antibiotics and repeated joint aspiration. Washout of the infected joint (usually in the operating room) may be needed if no improvement.



SCRIPT

Middle-aged Caucasian male presents with:

- Weight loss with cachexia
- Chronic nonbloody diarrhea
- Severe migratory arthralgias for years
- Generalized lymphadenopathy
- Vertical gaze palsy and ataxia

What is the diagnosis?

Diagnosis is **Whipple disease**.

The clinical scenario could include dementia as a late feature. In real life, you would exclude hyperthyroidism, connective tissue disorders, HIV/AIDS, and inflammatory bowel disease before embarking on a diagnostic strategy for Whipple's. This is a hard script, but the presence of odd neurologic symptoms in the setting of arthralgias (usually precedes other symptoms) and severe diarrhea leading to wasting should help you reason that this is most likely not inflammatory bowel disease or a similar diagnosis.

Dx: Screen using PCR of saliva and stool; add biopsy of the small bowel (shows PAS-positive macrophages in infected patients) if you still highly suspect disease and screen is negative. PCR testing also can be done on the CSF or any neurologic tissue. The organism is very difficult to culture, so routine culturing is not performed.

Tx: Ceftriaxone for 2 weeks followed by 1 year of TMP/SMX; in CNS disease, the beta-lactam is used for 4 weeks prior to initiating TMP/SMX.



SCRIPT

Patient with known plaque psoriasis presents with:

- Lower back and hand pain and stiffness
- Nail pitting
- Active synovitis in multiple DIP joints
- 2 sausage digits

What is the diagnosis?

Diagnosis is **psoriatic arthritis**.

Recognize that there are several patterns of arthritis seen with psoriasis: DIP arthritis (looks like hand OA), symmetrical polyarthritis (looks like RA), oligoarthritis (1 knee or ankle), axial spondylitis (looks like AS), and arthritis mutilans (destroyed telescoping joints). More than 1 subtype can occur; unilateral knee swelling and DIP involvement. In real life, patients with psoriasis can have other arthritis as well—including RA and OA, but in an exam setting, the psoriasis history is likely to be relevant to the correct answer, which is psoriatic arthritis.

Dx: Clinical.

Tx: Analgesics (NSAIDs) + nonbiologic DMARD (methotrexate or sulfasalazine) for primarily peripheral disease, or TNF inhibitors if axial disease is present.



SCRIPT

Obese patient presents with:

- Pain and mild stiffness in both knees, worse with weight bearing and relieved with rest
- No inflammation or effusion; presence of crepitus and bony swelling
- Standing radiographs: Joint space narrowing and osteophytes without erosions

What is the diagnosis?

Diagnosis is **osteoarthritis**.

Remember that OA is asymmetric, nonerosive, and commonly causes pain in weight-bearing joints (knees, hips, low back), and distal/proximal phalangeal joints. OA rarely affects the wrists, MCPs, and small bones of the feet. The clinical picture should be one of loss of joint space and new bone formation (osteophytes). Involvement of unusual joints, such as the wrist, or erosions and/or chondrocalcinosis should make you think of other causes of joint pain. On the exam, if there are erosions present, it's **not** OA.

Dx: Clinical + radiographs of involved joints.

Tx: Non-narcotic analgesics (acetaminophen, NSAIDs), lifestyle modifications (weight loss, exercise), steroid injections to affected joints, viscosupplementation, physical therapy, surgery in refractory cases.



SCRIPT

Elderly woman presents with:

- Painful shoulder without history of trauma
- Decreased active range of motion and obvious swelling
- Radiograph: Degenerative arthritis and marked destruction of the humeral head
- Arthrocentesis: Hemorrhagic, non-inflammatory fluid without crystals under polarizing light
- Light microscopy and alizarin red staining of synovial fluid: Crystals

What is the diagnosis?

Diagnosis is **hydroxyapatite arthropathy**.

This is a rare condition but sometimes tested because of the need to do the special alizarin red stain to see the crystals under light microscopy—which is your clue to the diagnosis. You might have initially considered OA as a diagnosis, but you should recognize that OA is not this destructive. Gout does not affect the shoulder; CPPD is associated with positively birefringent crystals. The name of this destructive hemorrhagic arthritis in elderly women is “Milwaukee shoulder.”

Dx: Clinical (elderly female with destructive arthritis) + crystals with alizarin stain.

Tx: Analgesics + intraarticular corticosteroids + shoulder replacement if refractory.

SCRIPT

Afebrile patient from the northeast U.S. presents with:

- Chronically swollen and mildly painful knee for months
- Large knee effusion, warm to the touch but not erythematous
- Arthrocentesis: WBC 10,000-25,000 cells/mm³; no visible crystals, no organisms on Gram stain
- +Rheumatoid factor, +*B. burgdorferi* IFA, IgG *B. burgdorferi* Western blot

What is the diagnosis?

Diagnosis is **Lyme arthritis**.

This patient has Lyme arthritis. Note that +RF can be seen in other diseases (e.g., chronic infections, vasculitis, chronic lung disease) and **not** just with RA. Look at the clinical presentation. The positive two-stage testing (IFA and IgG Western blot), with the proper clinical history, definitively establishes the diagnosis of Lyme. Lyme arthritis is a late stage complication of infection, so the IgG should be positive. An IgM Western blot would not be considered a significant test, since the disease is late stage. A clinical scenario could also give you the erythema migrans rash or a Bell's palsy in the context of exposure to an endemic area and ask you the diagnosis.

Dx: Clinical + *B. burgdorferi* IFA or ELISA + *B. burgdorferi* IgG Western blot.

Tx: Oral doxycycline or amoxicillin x 21 days; refractory pain post-antibiotics should be treated with NSAIDs, but 1 month of parenteral treatment can be recommended if the patient still has objective evidence of disease. After 1 month of parenteral beta-lactam, the patient should be given analgesics for any further symptoms. Be aware that arthritis with evidence of CNS disease should be evaluated with lumbar puncture and treated with parenteral ceftriaxone x 1 month.



SCRIPT

Young male patient with a history of anterior uveitis presents with:

- Pain and stiffness in the back and groin that improve with exercise
- Asymmetric peripheral synovitis, especially knees/ankles
- Asymmetric soft tissue swelling that causes digit to resemble a sausage
- Tenderness and restricted range of motion of the Achilles tendon
- Hip radiographs: Evidence of bilateral sacroiliitis

What is the diagnosis?

Diagnosis is **ankylosing spondylitis**.

This presentation is not a simple lumbar spine problem because of the additional features of uveitis, sacroiliitis, dactylitis, peripheral arthritis, and Achilles enthesopathy. Only a spondyloarthritis explains all of these findings. Always think about the spondyloarthritides when a case presents an enthesitis. This presentation could be ankylosing spondylitis or inflammatory bowel disease related spondyloarthritis due to the bilateral sacroiliitis. Psoriatic arthritis (PsA) and reactive arthritis have unilateral sacroiliitis. Syndesmophytes are fine with AS, but bulky with PsA.

Dx: Reasonable studies include testing for bacteria that cause reactive arthritis (GI/GU organisms), HLA-B27 (if negative, excludes ankylosing spondylitis), HIV test, plain radiographs of SI joints $\pm$ L-spine or MRI (if plain films are normal).

Tx: Depends on underlying cause of spondyloarthritis: NSAIDs for all patients unless contraindicated; TNF inhibitors for axial disease if ankylosing spondylitis; antibiotics directed against the infection in acute infections; peripheral joint disease may respond to sulfasalazine, methotrexate.



SCRIPT

Young, sexually active patient treated 2 weeks prior for urethritis presents with:

- Back pain, greatest at night during sleep and improves with movement
- Pain in the heel(s)
- Conjunctivitis
- Swelling at the insertion of the Achilles tendon
- Single sausage toe
- Asymmetric peripheral arthritis, usually ankle/foot

What is the diagnosis?

Diagnosis is **reactive arthritis**.

The identifying feature of this case is the antecedent urethritis, presumably *Chlamydia trachomatis*. Most often, the reactive arthritis occurs within 2 months of the GI or GU infection. Always think about the spondyloarthropathies when a case presents an enthesopathy.

Dx: Reasonable studies include testing for bacteria that cause reactive arthritis (GI/GU organisms), although often the testing is negative when the patient presents + HIV test + plain radiographs of L-spine or MRI (if plain films are normal).

Tx: Antibiotics directed against the infection followed by treatment for arthritis if doesn't resolve: Nonbiologic DMARD, usually for non-axial disease (see above).



SCRIPT

Young female patient with h/o Raynaud's presents with:

- Fever
- Weight loss
- Fatigue
- Arthralgias
- Several small, **painless** mouth ulcers
- Maculopapular rash on the cheeks, extends across the nose but spares the nasolabial fold
- Active bilateral synovitis of MCPs and PIPs
- Hand radiographs: No erosions
- ↓ WBC, Hgb, Hct, Plt
- +: Coombs test, RPR, ANA, anti-Sm, and anti-dsDNA

What is the diagnosis?

Diagnosis is **systemic lupus erythematosus**.

This one is so easy that you should give yourself 50 lashings and say "shame on you" to the mirror if you missed it. Nothing, repeat, nothing looks like lupus, when you consider all of the findings in aggregate, as they are presented in an exam question. The challenge is picking all of the abnormalities out of a verbose clinical scenario. If you find you have trouble with this, make a problem list as you are reading through a question and include every abnormality, then look at all of the problems as an aggregate list or recall the mnemonic SOAP BRAIN MD.

Dx: Clinical and laboratory; American College of Rheumatology has a list of criteria for research purposes and requires 4 positive abnormalities for definitive diagnosis. Categories include mucocutaneous (rashes, photosensitivity, oral ulcers) + arthritis (nonerosive, symmetrical, polyarticular), serositis, glomerulonephritis, seizures or psychosis + blood dyscrasias (hemolytic anemia, leukopenia, thrombocytopenia) + immunologic (antiphospholipid antibody, anti-dsDNA, anti-Sm, ANA).

Tx: NSAIDs, corticosteroids, nonbiologic and biologic DMARDs.

SCRIPT

Middle-aged patient presents with:

- Itchy eyes with foreign body sensation
- Ocular mucus filaments
- Increase in tooth fillings
- Thick whitish plaques on an erythematous base on oral mucosa
- Schirmer tear test: Minimal tear production
- Positive anti-SSA (Ro) and -SSB (La) antibodies

What is the diagnosis?

Diagnosis is **Sjögren syndrome**.

The antibodies help you to know this is not some kind of allergic conjunctivitis. Sjögren's is often associated with increased dental caries and incidence of oral thrush. The clinical scenario could include symptoms of other autoimmune diseases since Sjögren's can be primary or secondary. Know that Sjögren's can be a severe disease with widespread manifestations, including pulmonary infiltrates, distal (Type 1) RTA with stone formation and nephrogenic diabetes insipidus, arthritis, and nervous system involvement. Late in disease, lymphoma can develop and is associated with parotid gland enlargement, blood dyscrasias, decreased complement, and loss of previously present autoantibodies.

Dx: Clinical and of exclusion + salivary biopsy + ANA and Ro/La antibodies.

Tx: Artificial tears, good oral hygiene and fluoride rinses, cholinergic agonists (e.g., pilocarpine, cevimeline) to increase secretions, nonbiologic DMARDs for peripheral arthritis, bicarbonate and water replacement for renal disease, and assessment/treatment for lymphoma.

SCRIPT

Patient on hydralazine for management of heart disease presents with:

- Fever
- Myalgias
- Arthralgias
- Scaly red rash in sun-exposed areas
- + ANA and antihistone antibody
- –anti-dsDNA antibody
- Normal U/A

What is the diagnosis?

Diagnosis is **drug-induced lupus**.

Alternative drugs that could be in the clinical scenario include isoniazid, procainamide, diltiazem, and anti-TNF drugs such as infliximab and etanercept. The latter 2 drugs, however, are often associated with +anti-dsDNA tests, but the lupus syndrome disappears after the TNF inhibitor is discontinued.

The antihistone antibodies are the ones associated with drug-induced lupus.

Dx: Clinical.

Tx: Withdraw the offending drug.



SCRIPT

30-year-old female patient presents with:

- Arthralgias/arthritis
- Myalgias of proximal muscles
- Fatigue
- Fevers
- Reflux symptoms
- Fingers turn white, then blue, then red, upon exposure to cold
- Painless mouth ulcerations and mild sclerodactyly, but no active synovitis or finger ulcers
- ↓ WBC, Hgb, and Hct
- Normal MCV and MCHC
- +: ANA, anti-U1-RNP, RF, and anti-CCP
- -: Anti-SSA, -SSB, and -dsDNA
- -RPR
- Normal CPK
- Normal U/A

What is the diagnosis?

Diagnosis is **mixed connective tissue disease**.

Anti-U1-RNP is sensitive for MCTD. The scenario presents features of several connective tissue diseases that don't traditionally occur together: Reflux symptoms and sclerodactyly = systemic sclerosis; mouth ulcers and leukopenia = SLE; arthralgias/arthritis and +RF suggests RA; myalgias = myositis. Nonspecific features include fever, weight loss, Raynaud's (seen commonly in many different connective tissue diseases), and anemia of chronic disease. Diagnosis of MCTD is more common in females.

Dx: Clinical and of exclusion + anti-U1-RNP.

Tx: Glucocorticoids.



SCRIPT

Young patient presents with:

- Fever > 1 week
- Salmon-colored, evanescent, maculopapular skin rash that appears only with fever
- Migratory polyarthrititis, especially involving knees, wrists, and elbows
- ↑ Peripheral WBC (differential: ↑ Neutrophils), AST, and ALT
- Negative ANA and RF
- Serum ferritin > 10,000 ng/mL

What is the diagnosis?

Diagnosis is **adult-onset Still's disease**.

The clinical scenario could include complaints of sore throat and lymphadenopathy and/or splenomegaly. The markedly elevated ferritin and the evanescent rash that disappears with defervescence are 2 big clues as to the diagnosis. Adult-onset Still's can be confused with acute rheumatic fever (but does not meet all of the Jones criteria) and disseminated gonorrhea (all cultures return negative in Still's, however). You might have guessed systemic lupus because of the arthritis, but remember that SLE presents as a symmetric, nonerosive, polyarticular arthritis.

Dx: Clinical (exclude other etiologies, especially drug reaction, malignancy, infection, and connective tissue diseases); Yamaguchi criteria exist (4 major and 5 minor) if you need something objective.

Tx: NSAIDs; corticosteroids if NSAIDs do not arrest disease quickly. Methotrexate and biologic DMARDs are used in most severe refractory cases. Note that macrophage activation syndrome (MAS) can be a complication of therapy in patients with Still's; recognize MAS by the patient's deterioration in the setting of improved ESR.



SCRIPT

Female teen presents with:

- Hands turn colors in the cold (white, blue, then red) and hurt
- Negative review of systems
- Normal exam
- Negative ANA

What is the diagnosis?

Diagnosis is **primary Raynaud's**.

Think about Raynaud's as a feature of an autoimmune process if the review of systems suggests alternative diagnoses, or if fingertip ulcerations or abnormal nail bed capillary exam is present.

Primary Raynaud's is more common in females.

Dx: Clinical; exclude primary autoimmune disease. Nailfold capillaroscopy is normal in primary Raynaud disease.

Tx: Keep the whole body warm (not just the hands!) + CCBs.

SCRIPT

Patient age 40–50 years presents with:

- Myalgias
- Symmetric, proximal weakness for several months
- No skin rash
- ↑ Serum AST, ALT, LDH, and CPK

What is the diagnosis?

Diagnosis is **polymyositis**.

You might have guessed inclusion body myositis (IBM), instead of polymyositis. IBM features both proximal and distal weakness with classic wasting of the flexors in the hands, anterior tibial muscles, and quadriceps. The script is not dermatomyositis because it lacks the classic skin features. The scenario lacks any discussion of medications, so this is not a statin or steroid myopathy. Chronic steroid myopathies also have normal serum CPK levels and lack inflammation on a biopsy. There is nothing in the scenario to suggest hypothyroidism. Myasthenia has normal muscle enzymes and +acetylcholine receptor antibodies. Remember that poly- and dermatomyositis can involve the lungs ([ILD] and that the anti-Jo-1 antibody is strongly associated with ILD), esophagus, skin, and heart as well. ~ 10% of these patients have an underlying malignancy, which usually is known about at the time that the myositis manifests.

Dx: Clinical + CPK, AST, ALT, and LDH (all increased) + EMG + muscle biopsy showing inflammation.

Tx: Glucocorticoids + when severely ill, azathioprine or methotrexate.

SCRIPT

Patient age 40–50 years presents with:

- Myalgias
- Symmetric, proximal weakness for several months
- Scaly, erythematous macules over PIPs and DIPs
- Violaceous circles around the eyes
- Diffusely erythematous rash over the anterior chest
- ↑ Serum AST, ALT, LDH, and CPK

What is the diagnosis?

Diagnosis is **dermatomyositis**.

The distinguishing features of this presentation are the Gottron papules, heliotrope rash, and the "shawl" rash. Anti-Mi-2 antibody is associated with classic DM, the shawl sign, and carries a good prognosis. Remember that poly- and dermatomyositis can involve the lungs ([ILD] and that the anti-Jo-1 antibody is strongly associated with ILD), esophagus, skin, and heart as well. ~ 15–20% of patients with DM have an underlying malignancy, which usually is known about at the time that the myositis manifests. In patients who are anti-p155/140, the risk/prevalence of cancer approaches 70%.

Dx: Clinical + CPK, AST, ALT, and LDH (all increased) + EMG + muscle biopsy showing inflammation.

Tx: Glucocorticoids + when severely ill, azathioprine or methotrexate.

SCRIPT

Patient age 40–50 years presents with acute onset:

- Fever
- Symmetric, proximal weakness for several weeks
- Raynaud's
- Symmetric synovitis of the MCPs
- Severe cracking and roughness of fingers with yellow/brown spots
- ± Violaceous circles around the eyes
- ± Scaly, erythematous macules over PIPs and DIPs
- ± Diffusely erythematous rash over anterior chest
- ↑ Serum AST, ALT, LDH, and CPK
- Positive anti-Jo-1 antibody

What is the diagnosis?

Diagnosis is **antisynthetase syndrome**.

Antisynthetase syndrome is a specific clinical presentation of dermatomyositis that is acute in onset and defined by: Constitutional symptoms, arthritis, interstitial lung disease, Raynaud's, "mechanic's hands"(rough and cracked fingers), and presence of an antisynthetase antibody, typically anti-Jo-1.

Dx: Clinical + CPK, AST, ALT, and LDH (all increased) + anti-Jo-1 antibodies + EMG + muscle biopsy showing inflammation.

Tx: Glucocorticoids + when severely ill, azathioprine or methotrexate.

SCRIPT

Patient on long-term statin treatment for hypercholesterolemia presents with:

- Diffuse muscle aches
- Weakness
- ↑ Serum AST, ALT, LDH, and CPK

What is the diagnosis?

Diagnosis is **drug-induced myopathy**.

The clinical scenario could include a patient with COPD who has been on long-term oral prednisone and develops worsening dyspnea (due to respiratory muscle weakness). In chronic steroid myopathy, the muscle enzymes are usually normal. The diagnosis is one of exclusion, and you need a high index of suspicion.

Dx: Clinical.

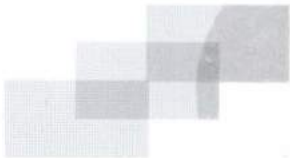
Tx: Remove the offending drug.



MedStudy®

Abbreviations Guide

2014-2015



INTERNAL MEDICINE

CORE SCRIPTS® FLASH CARDS

Abbreviation	Definition
5-HIAA	5-hydroxyindoleacetic acid
ABPA	allergic bronchopulmonary aspergillosis
ACEI	angiotensin-converting enzyme inhibitor
AchR	acetylcholine receptor
ACP	The American College of Physicians
ACPA	anti-citrullinated peptide antibody
ACR	American College of Rheumatology
ACTH	adrenocorticotrophic hormone
ADH	antidiuretic hormone

Abbreviation	Definition
ADHD	attention deficit hyperactivity disorder
ADL	activities of daily living
AF	atrial fibrillation
AGA	American Gastroenterological Association
AH	autoimmune hepatitis
AI	adrenal insufficiency or aortic insufficiency
AIN	acute interstitial nephritis
AK	actinic keratosis
AKI	acute kidney injury

Abbreviation	Definition
ALS	amyotrophic lateral sclerosis
ALT	alanine aminotransferase
ALZ	Alzheimer disease
AMI	acute myocardial infarction
AML	acute myeloid leukemia
ANA	anti-nuclear antibody
anti-TPO	anti-thyroid peroxidase antibody
APA	antiphospholipid antibody
aPML	Acute promyelocytic leukemia
AR	aortic regurgitation
ART	antiretroviral therapy

Abbreviation	Definition
AS	aortic stenosis
ASA	aspirin
ASD	atrial septal defect
AST	aspartate aminotransferase
ATN	acute tubular necrosis
ATRA	all- <i>trans</i> retinoic acid
ATS	American Thoracic Society
AV	aortic valve
AVM	arteriovenous malformation
BAL	bronchoalveolar lavage
BL	beta-lactam drug

Abbreviation	Definition
BMI	body mass index
BMT	bone marrow transplant
BPH	benign prostatic hypertrophy
BPV	benign positional vertigo
BRCA	breast cancer gene
BSA	body surface area
CA	cancer
CABG	coronary artery bypass graft
CAP	community-acquired pneumonia
CCBs	calcium channel blocker(s)
CDC	Centers for Disease Control

Abbreviation	Definition
CF	cystic fibrosis
CHD	coronary heart disease
CHF	congestive heart failure
CI	cholinesterase inhibitor or continuous infusion
CJD	Creutzfeld-Jakob disease
CKD	chronic kidney disease
CLL	chronic lymphocytic leukemia
CML	chronic myelogenous leukemia
CMV	cytomegalovirus
CO	carbon monoxide or cardiac output
CPK	creatinine phosphokinase

Abbreviation	Definition
CPP	cerebral perfusion pressure
CPPD	calcium pyrophosphate deposition disease
CRP	C-reactive protein
CS	Churg-Strauss vasculitis
CTA	CT angiogram
CXT	chemotherapy
DBP	diastolic blood pressure
DFA	direct fluorescent antibody
DDAVP®	desmopressin
DHEA	dehydroepiandrosterone
DIC	disseminated intravascular coagulation

Abbreviation	Definition
DIP	distal interphalangeal joint
DKA	diabetic ketoacidosis
DLB	dementia with Lewy bodies
DLCO	linear diffusion of carbon monoxide
DM	diabetes mellitus
DMARD	disease modifying antirheumatic drug
DSM	diagnosis and statistics manual
DVT	deep venous thrombosis
DWI	diffusion weighted images
DXA	(bone density scan) dual-energy x-ray absorptiometry
EBV	Epstein Barr virus

Abbreviation	Definition
ECG	electrocardiogram
ED	emergency department
EDH	epidural hemorrhage
EEG	electroencephalography
EF	ejection fraction
EGD	esophagoduodenoscopy
EHEC	enterohemorrhagic <i>E. coli</i>
EM	erythema multiforme
EMG	electromyography
EN	erythema nodosum
EP	electrophysiology testing

Abbreviation	Definition
ET	essential thrombocytosis
FAP	familial adenomatous polyposis
FDE	fixed drug eruption
FEV₁	forced expiratory volume in 1 second
FH	family history
FNA	fine needle aspiration
FPG	fasting plasma glucose
FQ	fluoroquinolone(s)
FSGS	focal segmental glomerulosclerosis
FSH	follicle stimulating hormone
FTD	frontotemporal dementia
FVC	forced vital capacity

Abbreviation	Definition
GA	granuloma annulare
GAS	group A streptococci
GBM	glomerular basement membrane
GBS	Guillain-Barré syndrome
GERD	gastroesophageal reflux disease
GGT	gamma-glutamyl transpeptidase
GMS	Gomori methenamine silver
GN	glomerulonephritis
GPA	granulomatosis with polyangiitis (previously Wegener's)
GPC	gram-positive cocci
HA	headaches

Abbreviation	Definition
HAE	hereditary angioedema
HAGMA	high anion gap metabolic acidosis
HAV	hepatitis A virus
HBsAg	hepatitis B surface antigen
HBV	hepatitis B virus
HCM	hypertrophic cardiomyopathy
Hct	hematocrit
HCTZ	hydrochlorothiazide
HCV	hepatitis C virus
HF	heart failure
Hgb	hemoglobin

Abbreviation	Definition
HIDA	hepatobiliary iminodiacetic acid
HOA	hypertrophic osteoarthropathy
HPV	human papilloma virus
HR	heart rate
HRCT	high resolution contrast tomography scan
HRT	hormone replacement therapy
HS	hydradenitis suppurativa
HSV	herpes simplex virus
HTN	hypertension
IBC	inflammatory breast cancer

Abbreviation	Definition
IBD	inflammatory bowel disease
IBM	inclusion body myositis
IBS	irritable bowel syndrome
ICH	intracerebral hemorrhage
ICP	intracranial or intracerebral pressure
ICS	inhaled corticosteroids
IDA	iron deficiency anemia
IDU	injection drug use
IIH	idiopathic intracranial hypertension
ILD	interstitial lung disease
IM	intramuscular

Abbreviation	Definition	Abbreviation	Definition
INH	isoniazid	LDH	lactate dehydrogenase
IPA	invasive pulmonary aspergillosis	LES	lower esophageal sphincter
IPAH	idiopathic pulmonary arterial hypertension	LH	luteinizing hormone
IPF	idiopathic pulmonary fibrosis	LLD	left lateral decubitus
iPTH	intact parathyroid hormone	LLSB	left lower sternal border
IUD	intrauterine device	LMS	lateral medullary syndrome
IVF	IV fluids	LTRA	leukotriene receptor antagonists
IVIG	IV immune globulin	M3	acute promyelocytic leukemia (AML-M3)
La	anti-SSB antibody	MAC	<i>Mycobacterium avium</i> complex
LABA	long-acting beta-agonists	MAT	multifocal atrial tachycardia
LAP	leukocyte alkaline phosphatase	MCA	middle cerebral artery

Abbreviation	Definition
MCHC	mean cell hemoglobin concentration
MCI	minor cognitive impairment
MCP	metacarpophalangeal joint
MCTD	mixed connective tissue disease
MCV	mean corpuscular volume
MDMA	3,4-methylenedioxy-N-methylamphetamine
MG	myasthenia gravis
MGUS	monoclonal gammopathy of undetermined significance
ML	macrolide
MM	multiple myeloma

Abbreviation	Definition
MMA	methylmalonic acid
MR	mitral regurgitation or magnetic resonance
MRA	magnetic resonance angiogram
mRNA	<i>BCR-ABL</i> fusion mRNA
MRSA	methicillin-resistant <i>Staphylococcus aureus</i>
MS	multiple sclerosis or mitral stenosis or mental status
MSSA	methicillin-sensitive <i>Staphylococcus aureus</i>
MuSK	muscle specific kinase receptor

Abbreviation	Definition
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MV	mitral valve
MVA	motor vehicle accident
MVP	mitral valve prolapse
MVR	mitral valve replacement
NAGMA	non-anion gap metabolic acidosis
NMS	neuroleptic malignant syndrome
NMTT	N-methylthiotetrazole
NPH	normal pressure hydrocephalus
OA	osteoarthritis
OCD	obsessive compulsive disorder
OCP	oral contraceptive pill(s)

Abbreviation	Definition
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OG	osmolar gap
OI	osteogenesis imperfecta
OP	opening pressure
OR	operating room
OSA	obstructive sleep apnea
OTC	over-the-counter
PAC	plasma aldosterone concentration
PAN	polyarteritis nodosa
PCK	polycystic kidney disease
PCN G	intramuscular penicillin G
PCR	polymerase chain reaction

Abbreviation	Definition
PCT	porphyria cutanea tarda
PG	pyoderma gangrenosum
PIGN	post-infectious glomerulonephritis
PIP	proximal interphalangeal joint
PJP	<i>Pneumocystis jiroveci</i> pneumonia
Plt	platelet
PMH	past medical history
PML	progressive multifocal leukoencephalopathy
PMR	polymyalgia rheumatica
PNH	paroxysmal nocturnal hemoglobinuria

Abbreviation	Definition
PPD	purified protein derivative
PPI	proton pump inhibitor
PRA	plasma renin activity
PSA	prostate specific antigen
PSC	primary sclerosing cholangitis
PTH	parathyroid hormone
PVC	premature ventricular contractions
RA	rheumatoid arthritis
RADS	reactive airways disease
RAE	right atrial enlargement
RAIU	radioactive iodine uptake

Abbreviation	Definition
RAP	right atrial pressure
RBBB	right bundle-branch block
RCoF	ristocetin cofactor
RF	risk factor or rheumatoid factor
R-FQ	respiratory fluoroquinolone
RIPA	ristocetin induced platelet aggregation
RLS	restless leg syndrome
RMSF	Rocky Mountain spotted fever
Ro	Anti-SSA antibody
ROM	range of motion
ROS	review of systems

Abbreviation	Definition
RPGN	rapidly progressive glomerulonephritis
RSV	respiratory syncytial virus
RTA	renal tubular acidosis
RV	residual volume
s/p	status-post
SABA	short-acting beta-agonists
SAH	subarachnoid hemorrhage
SBFT	small bowel follow through
SBP	systolic blood pressure
SC	sickle cell
SCC	squamous cell carcinoma

Abbreviation	Definition
SD	standard deviations
SDH	subdural hematoma
SE	side effects
SI	sacroiliac
SJS	Stevens-Johnson syndrome
SLE	systemic lupus erythematosus
SPEP	serum protein electrophoresis
SS	symptom severity scale or type of hemoglobin
SSRI	selective serotonin reuptake inhibitor
STDs	sexually transmitted diseases

Abbreviation	Definition
STEMI	ST-elevation myocardial infarction
SVC	superior vena cava
T2DM	type 2 diabetes mellitus
TCA	tricyclic antidepressant
TEE	transesophageal echocardiogram
THR	total hip replacement
TIA	transient ischemic attack
TLC	total lung capacity
TLS	tumor lysis syndrome
TM	transverse myelitis
TMP/SMX	trimethoprim/sulfamethoxazole

Abbreviation	Definition
TNF	tumor necrosis factor
TNM	tumor node metastasis
TR	tricuspid regurgitation
TSH	thyroid stimulating hormone
TSS	toxic shock syndrome
TTP	thrombotic thrombocytopenic purpura
TV	tinea versicolor
U/A	urinalysis
U/S	ultrasound
UC	ulcerative colitis
UGI	upper GI

Abbreviation	Definition
URI	upper respiratory infection
UV	ultraviolet
VP	ventriculoperitoneal
VSD	ventricular septal defect
vWB	von Willebrand
vWD	von Willebrand disease
vWF	von Willebrand factor
WE	Wernicke encephalopathy
WHO	World Health Organization
XRT	x-ray therapy
Z-E	Zollinger-Ellison syndrome

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As a result of participation in this activity, learners will be able to:

- Integrate and demonstrate increased overall knowledge of Internal Medicine
- Identify and remedy areas of weakness (gaps) in knowledge and clinical competencies
- Describe the classic presentations of diseases encountered in Internal Medicine, and effectively narrow the differential diagnosis list by recognizing distinguishing elements of the history, physical exam, and laboratory and radiologic data
- Apply the competence and confidence gained through participation in this activity to both a successful Board exam-taking experience and daily practice

Target Audience

Participants in this educational activity are those physicians seeking to assess, expand, and/or reinforce their knowledge, decision-making strategies, and clinical competencies in Internal Medicine, focusing their learning on subjects that are directly relevant to clinical scenarios which will be encountered in the practice setting, as well as on the ABIM Certification or Recertification Board exam.

Method of Participation

This flash card product was designed to help learners commit to memory the classic illness scripts for the most frequently encountered and tested disease states. First, consider the patient's problem scenario ("illness script") on the front of the card. Then, decide the diagnosis. Turn the card over to see if you're correct. On the back of the card, you'll also find a short explanation and helpful details regarding diagnosis and treatment for that "illness script." Each card includes a reference to a specific page in the 16th Edition MedStudy Internal Medicine Review Core Curriculum that will offer additional information related to that card's topic. To further challenge your knowledge and integrative diagnostic judgment skills, shuffle the cards without knowing the key subspecialty category across two or more subspecialty areas. Participants will be required to complete a posttest as part of the requirements for receiving CME credit for this product.

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